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SECOND ANNUAL REPORT

OF THE

Health Commissioner

OF

MILWAUKEE.

(THIRTEENTH ANNUAL REPORT OF THE DEPARTMENT.)

JANUARY, 1880.

MILWAUKEE:

EDWARD KROGH, PRINTER TO THE CITY.

437 EAST WATER STREET.

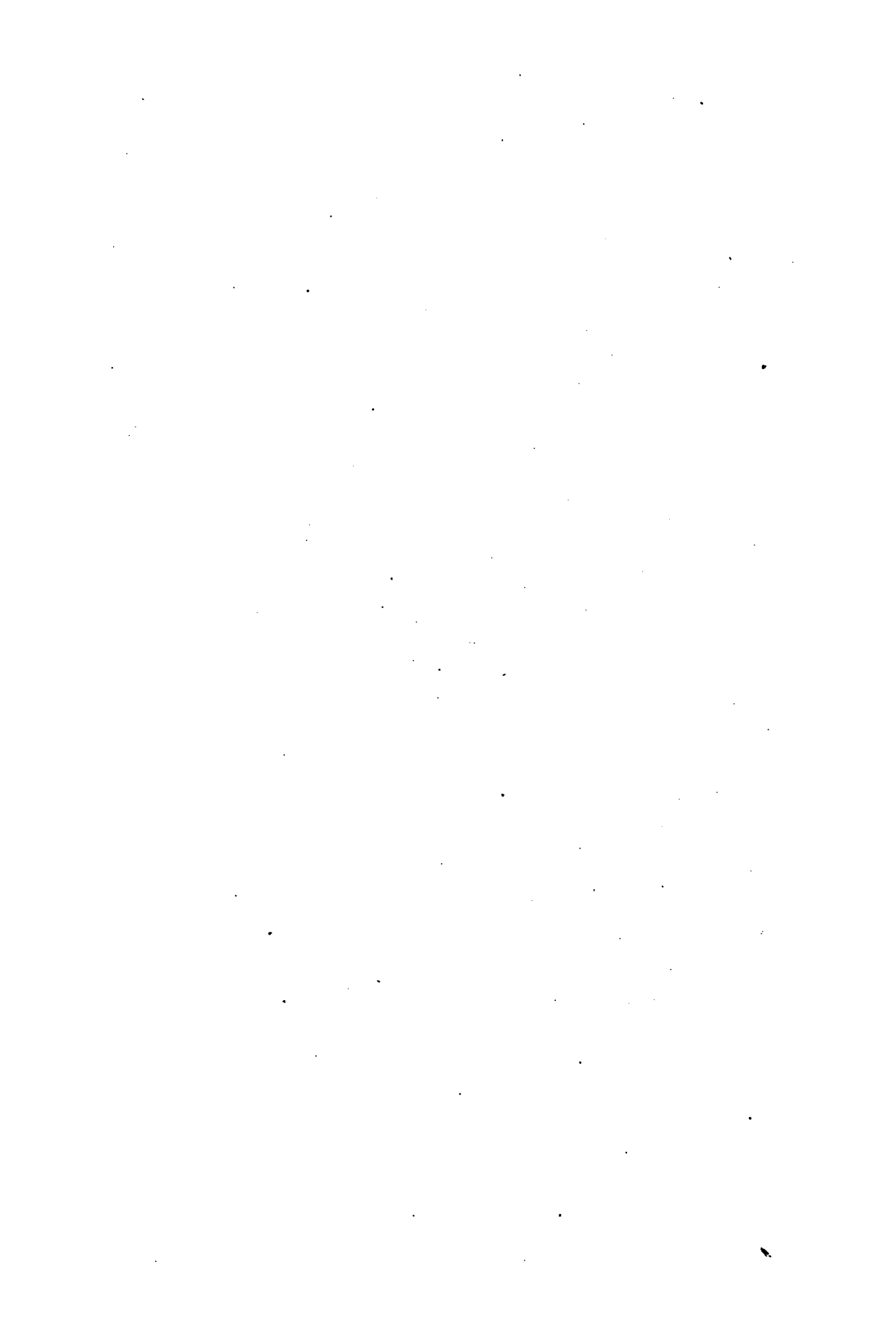
1880.

With the Compliments of

O. W. WIGHT, A. M., M. D., ATTORNEY-AT-LAW,

Health Commissioner of Milwaukee.





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At

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MEMBERS OF THE HEALTH DEPARTMENT.

O. W. WIGHT, A. M., M. D.,	-	COMMISSIONER OF HEALTH.
E. H. G. MEACHEM, M. D.,	- -	ASSISTANT COMMISSIONER.
A. F. KALCKHOFF, M. D.,	-	ASSISTANT COMMISSIONER.
E. W. DIERCKS,	- - - - -	SECRETARY.
E. W. TALLMADGE,	- - - - -	INSPECTOR.
G. KOEPEL,	- - - - -	MEAT INSPECTOR.

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GENERAL REPORT OF THE COMMISSIONER.

OFFICE OF THE COMMISSIONER OF HEALTH, }
JANUARY, 1880. }

To the Honorable, the Mayor and Common Council of the City of Milwaukee:

The Commissioner of Health, herewith respectfully presents his Second Annual Report, the same being the Thirteenth Annual Report of the Health Department of Milwaukee.

OBJECT OF THE REPORT.

My aim in this Report is to give to the members of the legislative branch of the municipal government, and through them to the people of Milwaukee, (1) a faithful account of the transactions and expenditures of the Health Department during the year, and (2) such hygienic instruction as our citizens in general seem most to require. In recounting the work of sanitary administration and explaining its rational foundations, it will not be expected that original contributions to Sanitary Science should be undertaken.

Reasons for, and methods of, preserving the Public Health are nearly the same everywhere. What John Simon, the great master of sanitation, says of England, is just as true of Milwaukee.

"Among causes which injuriously affect the Public Health of England," he wrote in 1875, "considered as a total, certain operate only in particular districts: as, for instance, some large adjacency of malarious or water-logged land, or some prevalent injurious industry: while others, though no doubt in widely different degrees, appear to be of general, perhaps nearly universal, operation. Foremost

in the latter class, and constituting in my opinion objects which claim earliest attention in the sanitary government of England, two gigantic evils stand conspicuous,—

“First, the omission (whether through neglect or through want of skill) to make the due removal of refuse-matters, solid and liquid, from inhabited places; and,

“Secondly, the license which is permitted to cases of dangerous infectious diseases to scatter abroad the seeds of their infection.

“In certain very important cases, injury—immense injury—accruing to the public health, arises from a co-operation of these two evils: arises, namely, through the special facility which certain forms of local uncleanness provide for the spreading of certain specific infections; and the influence which uncleanness almost necessarily exerts in that way against the public health makes so large an addition to the influence which it exerts in other ways, that, in total power, uncleanness must, I think, without doubt, be reckoned as the deadliest of our present removable causes of disease.”

In the two directions of preventing the spread of infectious diseases and removing the causes of uncleanness, I have unremittingly used such means as have been placed at my disposal, and have exercised such authority as the laws confer. In order to bring the subject of infectious diseases vividly before the minds of citizens, I have chosen, for historical discussion in the main body of this Report, one of the great epidemic maladies that are diffused by negligence and filth, that cleanliness and isolation cause to disappear.

THE PLAGUE.

This disease belongs to the same class with Typhus, Typhoid, Asiatic Cholera, Yellow Fever, Diphtheria, Scarletina, Small-Pox, Malignant Dysentery, and some others. I have chosen the Plague for discussion, because its wonderful history will place in most prominent relief features that are common to the class. Like the others, it lingers in an endemic form among the haunts of misery, want, ignorance, and degeneracy of race. Like the rest, it leaps from its lair, when unobstructed, and invades the homes of the intelligent, and well-to-do class, by infection. Like the rest, it has

been declared by the perversity, the ignorance, the assumption, or something worse, of a small but noisy and persistent part of the medical profession, to be non-infectious, and has been left to spread and destroy mankind. It was regarded in former times as a mysterious visitation of Divine Providence, and consequently no measures were taken to arrest its course. Other diseases of the class, now more prevalent, are regarded by many in the same light, and therefore the sanitarian has to deal with the stubborn apathy of superstition.

Typhus is nearest of kin to Plague. While it persists in the midst of poverty, filth and overcrowding on the other side of the Ocean, it has fortunately never prevailed to any great extent in our American centres of population. Typhoid is a member of the same family and is too well known in all lands. Malignant Cholera is a "tramp" from the same household, but has fortunately been greatly restricted in its wanderings by a more intelligent quarantine and by increased cleanliness. Yellow Fever is first cousin to Plague and will continue to desolate portions of this country, till our Southern cities practice sanitation better and the Federal Government undertakes the duty of preventing its periodical importation. Diphtheria, like Plague, feeds on filth and is propagated by infection. Scarletina is the more fervid, but not less malignant, sister of Diphtheria. Both knock at our doors with murderous hands and will not leave till sanitary administration is allowed to enforce with more rigor the isolation and cleanliness taught by advancing sanitary science. Small-Pox is the "Wandering Jew" of the epidemic family, but human ingenuity has tamed its destructive spirit with the cunning of vaccination. Here, again, cleanliness and isolation can do the rest.

It cannot be too often repeated—the whole family of the epidemic foes of mankind can be banished by isolation and cleanliness. The coarser Plague goes first, then, one after another, the rest. And by the same means, the other conditions of health and well-being will be greatly improved. Herein lies the chief work of sanitation.

SANITARY ADMINISTRATION.

The routine work of my office has revealed to me that the only way to remove filth and isolate infectious disease is by the enforcement of law. Our community believes in law and order. Reasonable regulations for promoting the public health are readily obeyed by ninety-nine out of a hundred. Yet scarcely one per cent. of the population would voluntarily undertake to do any efficient sanitary work. Hygienic propositions will receive ready enough assent, but an order according to law alone secures the removal of filth and the isolation of communicable disease. Reflection upon such a state of things has led me to consider the defects of sanitary administration, not only in Milwaukee, but also in the State and in the country at large. I have, therefore, devoted a chapter in this Report to a consideration of the subject of sanitary legislation. In Great Britain, the undisputed conclusions of sanitary science have from time to time been embodied in important Acts of Parliament, now for a quarter of a century or more. The result is, that in Great Britain, sanitation has become a work of administration and is not a mere teaching. There, all theories are put to the test of practice and sanitary progress has been very substantial. In this country, sanitary law is mainly confined to cities. Of course, without law there can be no administration. But administration does not always follow where law exists. The sanitary code of Milwaukee, although one of the best municipal codes in the country, is not only crude and defective, but, much of it being permissive and not mandatory, it does not necessitate its own execution. In the country about the city there is no sanitary administration at all. The Health Department, here, instead of finding co-operation in the adjoining districts, has to contend against absolute sanitary negligence there.

Whatever may be thought of the plans proposed for state and national sanitary codes, I hope the arguments advanced in favor of transition from mere teaching to administration will be found worthy of attention. There is one thing certain, that I could not have

given in the same space a greater amount of sanitary instruction. The fact that I have given outlines of needed measures for a complete system of state and national sanitary administration, does not change the nature of the hygienic principles discussed.

MILK SUPPLY OF MILWAUKEE.

Not only as a narrative of an important item in the work of the Health Department, but also as a continuation of the discussion concerning the necessity of using all proper means to secure cleanliness and prevent the dissemination of infectious diseases, I have given a full statistical account of the milk supply of the city and have shown how one of the most important articles of food may become the vehicle of scattering dreaded maladies among unsuspecting families. The "impoverishment" of milk may and probably does, cause a loss to citizens equal to half a dozen times the cost of maintaining the Health Department, but that is an insignificant part of the evil. There is no doubt that poor and unhealthy milk causes much sickness and some death among the children of the city. Enteric fever, scarlatina and diphtheria find their way occasionally from the households of the producers to the families of the consumers. On this important point I have cited a considerable number of cases from the highest and most reliable authorities. In the absence of a general system of hygienic administration, it is impossible for the Health Officer of Milwaukee to obtain such knowledge of the sanitary condition of the families of dairymen in the surrounding country as would enable him to guard the people of the city against danger from such a source. It is unfortunate that less than 200 milkmen should have sufficient influence in city politics to deter members of the Common Council from enacting a proper measure for the public safety. If we had a proper health code for the State generally, the work of sanitary administration would not be limited by municipal boundaries. If the power is not already given in the city charter to put the sale of milk under the restraint of a license, then that instrument ought to be so amended by the legislature as to confer the necessary authority

upon the municipal government. Unless the organic public agency, which we call the State, can preserve the families of citizens against the dangers arising from the fouling, adulteration, or poisoning by disease-germs, of a necessary article of food, then the State forfeits its title to allegiance and is not worth preserving.

PREMATURE DEATH IN MILWAUKEE.

Quite recently there was published in London a remarkable little treatise, or health primer, entitled "Premature Death," in which the learned and able author gave a highly instructive analysis of the death statistics of England and Wales. By substitution of our local death statistics and by condensation, I have transformed that treatise into the article of this Report, bearing the above title. The transformation has perhaps cost me more labor than the writing of an original article would have imposed; but the matter as it now stands is of very great interest and value, not only to professional men and legislators, but also to public economists and all thoughtful citizens.

The closing portion of the treatise, devoted to the prevention of premature death, has given me most trouble; for there is a vast difference between the sanitary laws of England and the loose regulations of our municipal health ordinances. Many parts of the text I have been obliged to omit altogether, as entirely inapplicable here. In some places I have substituted the potential for the indicative mood, merely showing what *might* be done, if we had the proper laws. So far as our statutes and ordinances extend, I have pointed out their application. With such legislation as a basis for sanitary administration as I have discussed in the second general chapter of this Report, I might have been able to adopt the following language of our thoughtful author:

"This brief summary very imperfectly indicates the large provision made by the sanitary laws for the prevention of the various causes of premature death and to facilitate the action of individuals and of communities for the removal of the conditions under which these causes operate. It will have been observed, notwithstanding the brevity of the statement, how, with hardly an exception, the main conditions which have been described as concerned in the production of

premature death are more or less closely provided for remedially in the various laws. These laws are still imperfect in many details, but they fairly express and contain the main principles of the sanitary reformation of the country. Applied as they are now being applied, and notwithstanding much blundering and apathetic administration, they have effected incalculable benefits tending to the removal of sickness and the saving of life in many localities. That they are capable of affording wider and even greater benefits than have as yet been obtained from them cannot be gainsaid. Indeed, it may be asserted, that the whole power of the sanitary law for good is still very imperfectly understood. An averred inefficiency of the law often rests not so much in its imperfection as in the unintelligent way in which it is too commonly administered. And this imperfect administration is but the reflex of that insensitiveness and indifference which still so largely affects our communities in ordinary times in sanitary matters. Great as has been the awakening of the public at large to the importance of sanitary work in its relation to the welfare of families and of communities, it has not been such as to secure as yet that lively and intelligent interest in the subject which is the best security for continuous attention to it, and for successive improvements in sanitary law and administration. Seeing what remains to be done, we are apt, perhaps, to underrate what has been done. It is not long since the first comprehensive scheme of sanitary administration in this country received the sanction of the Legislature, and if it were not for the consciousness of how much remains undone, we might regard with justifiable pride the advances made in sanitary legislation, sanitary administration, and sanitary practice, within that brief period. But while a solitary spot remains which would justify the accounts we have given of some of the local conditions under which the causes of premature death operate, it would be idle to boast of facts which, in reality, are but a shadow of good things to come "

Instead of being able to say as much, we are obliged to confess that little has been done in this country, in the way of sanitary enactments to prevent premature death, except to piece together municipal sanitary codes, that are not much better than specimens of legal "patch-work" growing out of periodical exigencies.

THE RIVER NUISANCE

In order to carry forward the general sanitary theme of this Report, which is to discuss in as many local bearings as possible within reasonable limits the necessity of removing the filth conditions on which infectious diseases mainly depend for their vigorous growth and not unfrequently for their dissemination, I have collected

under the above title the instructions given from time to time during the past season by the Health Department to the Council and the public, on the subjects of sewage, fouling of the rivers, pollution of the water-supply, etc. It is important to preserve in a form for convenient reference the records of animated discussions concerning a distressing public nuisance, during a period of popular excitement and apprehension, even if the discussions have seemingly borne no practical fruit. Many people have learned a great deal about sanitary science which they never would have known if their attention had not been arrested by the river nuisance. Henceforth it will be impossible to adopt any plan to get rid of the evil, except under the vigilant eye of more or less enlightened public criticism. If the people had been as well instructed ten years ago, the present abominable system of sewerage would never have existed. A few gave warning of future trouble, but the official representatives of the people, as ignorant of sanitary facts and principles as the people themselves, sneered at the idea that trouble could ever arise from running the sewage of the town into the rivers. The experiment has been costly, and there are other dangers not less real although less obvious.

In this chapter of my Report I have carried the discussion more definitely than before into a new field. I have advocated the necessity of constructing a new system of sewerage, and have given, with sufficient detail, my reasons for its necessity. I understand well the sanitary questions that are involved, and do not propose to acquiesce in any engineering plan that ignores them, without making an earnest protest in behalf of the public. It is a sanitary canon that cannot be disregarded, without peril to the public health, that all organic refuse must be removed from habitations and collections of habitations in cities before it begins to undergo decomposition. The *methods* of removal are only questions of economy, engineering, and convenience. My convictions are very strong that in order to fulfil this imperative law of public hygiene in the city of Milwaukee, it is wisest and best, (a.) to remove all non-liquid organic refuse, including night soil from privies, by the "dry system," every day in summer and twice a week in winter, to land in the neighborhood;

and (b.) to remove all liquid organic refuse, including the contents of water-closets, by means of a new system of vitrified pipe sewers and proper pumping works, to a sewage farm. Existing sewers are needed for carrying off storm water and the water of sub-soil drainage.

Some means must also be devised for removing "dead" water from the rivers in hot weather and supplying its place with pure water from the lake, or the rivers will continue to stink in July and August however well the sewage may be intercepted. I have therefore recommended a plan of constructing wooden conduits to serve temporarily for intercepting sewers and for pumping foul water out of all the rivers, till such time as a perfect system of sewerage can be properly constructed.

SUBJECTS BRIEFLY DISCUSSED.

Under this general head, some of the sanitary questions suggested by Wooden Pavements, Physicians and Burial Permits, Sanitation of Public Institutions, Public Baths, Garbage Removal, Disinfectants, Qualifications of Health Officers, Consulting Engineers, Packing Houses, etc., have been considered as fully as time and space would permit. Many other subjects of great importance might have been discussed, but I have confined myself to such as have been forced upon my attention by the practical work of the Department, or have served to illustrate my theme of filth-removal and preventing the dissemination of infectious diseases. Especial attention is directed to disinfection by acids, as recently advocated by Dr. John Dougal, of Glasgow. Twenty-five hundred years ago, Horner said (*Odyssey*, Book xxii, 481, 482), "Bring me, O ancient dame, sulphur—the remedy for impurities, and bring me fire, that I may fumigate the palace." It is charming to find the sanitary wisdom of the earliest poetry confirmed by the latest science. The same science substantiates the Arabian and Mediæval tradition as to the disinfecting value of acetic acid, or vinegar. But it is not necessary to anticipate discussions which will be found with sufficient detail elsewhere.

The every-day work of the Health Department during the past year has been to carry out the two great sanitary precepts of John Simon, to "remove refuse-matters, solid and liquid, from inhabited places," and to permit no "license to cases of dangerous infectious diseases to scatter abroad the seeds of their infection." All the measures proposed by me to the Council, and urged before the public through the press, have had the same salutary ends in view. It is perhaps well that some of these measures have been resisted for the time being by the Council, in order that they might be matured by riper experience before final adoption. Wisdom is known of her children and those who have the public good really at heart can afford to labor and to wait.

CONCLUSION.

The latest substantiated facts in sanitary science have here been applied to the discussion of local questions of greatest importance. If some of these questions are not yet understood and appreciated the fault is not mine. There is no doubt in my mind that the work of the Health Department has saved many lives, has prevented much disease and suffering. Whatever may happen in the future, I shall cherish sentiments of regard for those whom I have toiled to benefit. Respectfully submitted,

O. W. WIGHT, M. D.,
Commissioner of Health.

THE PLAGUE AS THE TYPE OF DISEASES THAT MAY BE CONTROLLED BY CLEAN- LINESS AND ISOLATION.

"When ye are gathered together within your cities, I will send the pestilence among you."—MOSES.

"The science of prevention becomes a political and a social as well as a medical study."—DR. RICHARDSON.

"The progress of applied medical science is clearly marked by the history of epidemics which have ceased or partly ceased to afflict mankind."—SPONTANINI.

THE PLAGUE AS THE TYPE OF DISEASES THAT MAY BE CONTROLLED BY CLEAN- LINESS AND ISOLATION.

The plague has probably existed longer than human history and is still a source of terror to the whole civilized world. Antiquity was terribly familiar with it; a deeper gloom was added by it to the Dark Ages; and only a year or two since it threatened to become a greater calamity to the Russian Empire than the fierce Turkish war. Like small pox, typhoid fever, cholera, and other zymotic diseases, it seems to be an inheritance of mankind and reminds nations that there are invisible foes more destructive than enemies encountered on the battle field. Imagination clothes this most fatal of maladies with the typical attributes of pestilence; terror increases its destructive effects; superstition links it with the powers of evil; philosophy stands awe-struck in its dread presence; science is at a loss to account for its origin; and religion itself fails to see any silver lining to the cloud which it sometimes spreads, like an interminable pall, over the earth. The very name of Black Death, given to it during the epidemic of the fourteenth century, indicates that it adds a darker hue to "that lean fellow who beats all conquerors." About the middle of that century, it swept around the globe, as a great pandemic, and destroyed a large portion of mankind. A brief history of it will reveal better than tables of statistics the progress and aims of sanitary science.

THE PLAGUE IN MODERN TIMES.

That same Black Death desolated the Indian City of Pali from

1836 to 1838, and then spread to the districts of Guhrwal and Kumaon among the spurs of the Himalaya Mountains. In the provinces of Guzerat and Kutch it prevailed as an endemic from 1815 to 1821. Central Asia seems to be, not only the cradle of the human race, but also the cradle of all the diseases which flesh is heir to. Not long ago, these slumbering fires, fanned by recent Indian famine and the tempest of war raging around the Black Sea, threatened to kindle a new conflagration of disease which seemed, after a lapse of many decades, again destined to sweep over Europe. In the dead of winter, at a season of the year most unfavorable to the plague, Russia, making a mighty effort at self-protection, was obliged to extend a cordon of soldiers a thousand miles long, in order to quarantine the infected region of Western Asia. The governments of Germany, Austria, Italy, Spain and France, were taking energetic steps to guard their frontiers and ports against the introduction of the pest.

To trace its history backwards, the real bubo plague prevailed in Persian Kurdistan in 1871. The Arabs of Northern Africa, especially in the neighborhood of Benghasi, suffered with it in 1858 and 1859. It desolated Mesopotamia in 1857. Its history in Egypt comes down to 1844. In Asiatic Turkey we have to go back only to 1843 in order to find it. As late as 1841 it lingered in Europe. The island of Majorca suffered with it in 1820. Within the memory of the living, in 1815, the City of Noja, in lower Italy, was devastated by an epidemic of the plague. An epidemic of the disease also prevailed in Malta, that half-way house between the East and the West, in 1813. Around the Black Sea, in the Balkan peninsula, in the countries on the lower Danube, there were frequent outbreaks of the pestilence during the second and third decades of the present century.

According to *V. Morea, Storia della peste di Noja*, quoted by Liebermeister, "when cases of the plague occurred in the little town of Noja, in lower Italy, in 1815, troops were despatched immediately to surround the place with a cordon. The city was encircled by two deep ditches, and opposite the gates, these ditches were spanned by two drawbridges, which served as a means for the

introduction of provisions into the town, but no other communication was allowed. Only letters were allowed to leave the city and these had first to be dipped in vinegar.¹ Cannons were posted at the city gates. The ditches were occupied by sentinels, who were ordered to shoot down any one who approached and did not stand still the moment he was hailed. A plague patient, who escaped while delirious and attempted to pass the lines, was actually shot dead. Besides this strict cordon, two others were established outside of the first. Those who disobeyed the orders were treated with the greatest severity. An inhabitant of Noja who had thrown a pack of cards to the soldiers, together with the soldier who picked it up, were tried by court-martial and shot. In that quarter of the town where the plague first appeared and was the fiercest, 192 houses were burned or torn down." As Liebermeister adds, "such measures can only be understood by remembering that the devastation produced by the plague was fresh in the memory of the people. Lower Italy and Europe probably owed their protection from the plague to the severity practiced in this particular instance."²

There was a very severe epidemic of the plague in Russia and Holland near the close of the eighteenth century. There was a terrible visitation of it in Provence in 1720 and 1721. In the former year one-half of the inhabitants of Marseilles were swept off by it. The city of Toulon suffered the next year even worse. A very interesting account of it was written by a Frenchman named D'Antrechau. The book was translated into German and a very remarkable preface written to it by Reimarus. Liebermeister says of this preface: "It is, in fact, a special treatise 'On the General Characteristics of Infectious Epidemics,' in which the author—writing at the end of the last century—expresses in the main the same views as those which I have endeavored to set forth in the introduction to the infectious diseases." "The city of Toulon," says D'Antrechau, quoted and summarized by the great German pathologist, "had in August, 1720, according to an accurate census,

1. See the chapter on disinfectants in this Report.

2. From this may be learned an important lesson as to the utility of quarantine in yellow fever and other infectious diseases.

26,276 inhabitants. In 1721 the city was attacked by the plague, and the number of deaths—so far as the lists indicated—amounted to 13,283, or more than one-half of the entire population. In reality, however, the number was even greater. After the close of the epidemic a new census was taken, which returned only 10,493 inhabitants. The chief burgomaster of the city, who is the authority for this statement, and who was the only one of the municipal officers who survived the epidemic, does not deny that emigration may have contributed to the decrease in the population, but calculates that, including the strangers, more than 16,000 died. Of the survivors there were not more than 6,000 who had not had the disease. There were, accordingly, out of a population of 26,000 human beings, about 20,000 who had been taken sick, and of these 16,000 had died. For the whole of Provence, in which at that time more than sixty large and small places—the names of which are all stated—were visited by the plague, the number of the dead is estimated at 200,000; no accurate estimate has been made of the mortality in the other towns.”¹

PLAGUE IN THE MIDDLE AGES.

When we get back to the seventeenth, sixteenth, fifteenth and fourteenth centuries, epidemics of the plague were as common in Europe as epidemics of cholera in the nineteenth century. Mediaeval literature is full of the subject. Montaigne, writing in the last quarter of the sixteenth century, speaking of his own experience in the neighborhood of Bordeaux, says: “I, usually so hospitable, was obliged, painfully, to seek out a retreat for my family. We were a wandering family, fearful to our friends and to ourselves, creating horror wherever we went. Whenever one of us felt a pain, even in the little finger, we were obliged to decamp; for at such a time every disease is supposed to be plague. Not a hundredth part of the people of the neighborhood escaped. No one appeared to care for aught save sepulture. It grieved them to see corpses strewing the fields, at the mercy of wild beasts

1. In comparison with such a mortality the epidemic of yellow fever in 1878 was very mild indeed.

that flocked thither at once. Healthy men dug their graves in time; others got into them living. One of my workmen, with his hands and feet, drew the earth over him as he was dying." Macaulay, speaking of the great London plague in 1665, says: "A pestilence, surpassing in horror any that during three centuries had visited the island, swept away in six months, more than a hundred thousand human beings." Mr. Green, in his History of the English people, thus describes an earlier visitation of the pestilence: "The most terrible plague which the world had ever witnessed advanced from the East, and after devastating Europe from the shores of the Mediterranean to the Baltic, swooped at the close of 1348 upon Britain. The traditions of its destructiveness, and the panic-struck words of the statutes which followed it, have been more than justified by modern research. Of the three or four millions who then formed the population of England, more than one-half were swept away in its repeated visitations. Its ravages were fiercest in the greater towns, where filthy and undrained streets afforded a constant haunt to leprosy and fever. In the burial-ground which the piety of Sir Walter Manny had purchased for the citizens of London, a spot whose site was afterwards marked by the Charter House, more than fifty thousand corpses are said to have been interred. Nearly sixty thousand people perished at Norwich, while in Bristol the living were hardly able to bury the dead. But the Black Death fell on the village almost as fiercely as on the town. More than one-half of the priests of Yorkshire are known to have perished; in the diocese of Norwich two-thirds of the parishes were left without incumbents. The whole organization of labor was thrown out of gear. . . . 'The sheep and cattle strayed through the fields and corn,' says a contemporary, 'and there were none left who could drive them.' "

THE PLAGUE OF FLORENCE.

This is the same plague which Boccaccio describes in the Introduction to his Decameron. It has received in history the appellation of the plague of Florence, because that city was the residence of the author who described its local ravages so well.

For the same reason, 430 years before the Christian era, a pestilence that desolated the ancient world was called the Athenian plague, because its destructive effects in the most refined city of antiquity were described with imperishable eloquence by Thucydides, an Athenian author. It is thus the sublime privilege of genius to add lustre to everything it touches, even to the Black Death.

I give here the salient points of Boccaccio's terrible description, omitting his extraneous reflections. "In the year of our Lord 1348," he says, "there happened at Florence, the finest city in all Italy, a most terrible plague, which . . . had broken out some years before in the Levant ; and after passing from place to place, and making incredible havoc all the way, had now reached the West ; where, spite of all the means that art and human foresight could suggest, . . . it began to show itself in a sad and wonderful manner. . . . Few or none escaped. And the disease, by being communicated from the sick to the well, seemed daily to get a-head, and to rage the more, as fire will do by laying on fresh combustibles. . . . It is wonderful what I am going to mention ; which, had I not seen it with my own eyes, . . . I should never venture to relate: Such, I say, was the quality of the pestilential matter, as not only to pass from man to man, but, what is more strange, . . . that anything belonging to the infected, if touched by any other creature, would certainly infect, and even kill that creature in a short space of time ; and one instance of this kind I took particular notice of, namely, that the rags of a poor man just dead, being thrown into the street, and two hogs coming by at the same time and rooting amongst them, and shaking them about in their mouths, in less than an hour turned round and died on the spot. . . . Some holding it best to live temperately, and to avoid excesses of all kinds, made parties, and shut themselves up from the rest of the world ; . . . never listening to anything from without, to make them uneasy. Others maintained free living to be a better preservative, and would baulk no passion or appetite they wished to gratify ; . . . yet avoiding to come near the infected. Such at that time was the public distress, that the laws, human and divine, were not regarded.

. . . A third sort of people chose a method between these two; . . . eating and drinking what their appetites required, they walked everywhere with odors and nosegays to smell to . . . Others, . . . taking care of themselves only, men and women in great numbers, left the city, their houses, relations, and effects, and fled into the country. . . . I pass over the little regard that citizens and relations showed to each other; for their terror was such that a brother even fled from his brother, a wife from her husband, and, what is more uncommon, a parent from its own child. On which account numbers that fell sick could have no help but what the charity of friends, who were very few, or the avarice of servants supplied. . . . And many lost their lives who might have escaped had they been looked after at all. So that between the scarcity of servants and violence of the distemper, such numbers were continually dying, as made it terrible to hear as well as to behold. . . . Great numbers passed out of the world without a single person. . . . Few had the tears of their friends at their departure. . . . Even the women had learned to postpone every other concern to that of their own lives. . . . With regard to the lower sort, and many of a middling rank, the scene was still more affecting; for they staying at home either through poverty or hopes of succor in distress, fell sick daily by thousands, and, having nobody to attend them, generally died; some breathed their last in the streets, and others shut up in their own houses, when the stench that came from them made the first discovery of their deaths to the neighborhood. And, indeed, every place was filled with the dead. A method now was taken, . . . to clear all the houses, and lay the bodies at the doors; and every morning great numbers might be seen brought out in this manner. . . . Things were come to that pass, that men's lives were no more regarded than the lives of so many beasts. . . . The consecrated ground no longer containing the numbers which were continually brought thither, . . . they were forced to dig trenches and to put them in by hundreds, filing them up in rows, as goods are stowed in a ship, and throwing in a little earth till they were filled to the top. . . . It fared no better with the adjacent country; for to omit the different castles

about us, which presented the same view in miniature with the city, you might see the poor distressed labourers with their families, . . . languishing on the highways, in the fields, and in their own houses, and dying rather like cattle than human creatures; and growing dissolute in their manners like the citizens, and careless of everything, as supposing every day to be their last, their thoughts were not so much employed how to improve as to make use of their substance for their present support: whence it happened that the flocks, herds, etc., and the dogs themselves, ever faithful to their masters, being driven from their own homes, would wander, no regard being had to them, among the forsaken harvest. . . . Between March and following July . . . upwards of a hundred thousand souls perished in the city alone. . . . What magnificent dwellings, what noble palaces were then depopulated to the last person! what families extinct! what riches and vast possessions left, and no known heir to inherit! what number of both sexes in the prime and vigor of youth, whom in the morning neither Galen, Hippocrates, nor Æsculapius himself, but would have declared in perfect health, after dining heartily with their friends here, have supped with their departed friends in the other world!"

It may be remarked here in passing, that this vivid description of the plague is a fitting introduction to the moral Black Death of the book that follows. I regard the Decameron as the most vicious production of human genius. The portals of vice are painted with the delicate touch of a great master, and the diamond dust of faultless rhetoric is sifted over the leprosy within.

EUROPE AT THE TIME OF THE FLORENTINE PLAGUE.

I am tempted to take a glance over Europe during this awful year of the plague. One of its victims was Petrarch's Laura, immortalized by the genius of sentimentality. Rienzi, the proud, vain, arrogant tribune of Rome, as a tertiary of the austere Franciscans was in the wild Apennines of Southern Italy, wearing the single coarse gown and cord of the Order, breaking his fast with the hard fare of a medicant, in company with nobles who had cast off the garments of worldly pomp. Pope Clement was crouching

with terror in his palace at Avignon, while three-fourths of the inhabitants of the city were dying with the plague. He burned fires to keep the invisible enemy away from himself, while his people were perishing in awful numbers. Fra Angelo, brooding over the prophecies of Joachim, Oliva and Merlin, was predicting the downfall of Clement, and the election of some poor and saintly man who should restore the papacy to Rome. The streets of continental cities were wet with the blood of frenzied men, who flagellated their own naked bodies to propitiate the vengeance of God. The black wings of pestilence beat the air, and it seemed to the fervid imaginations of the suffering that the doom of a wicked world had come.

Whole volumes might be filled from contemporary literature concerning the visitations of plague in Mediaeval times. During the great plague described by Boccaccio probably one-half the population of Europe was swept away. Asia was afflicted at the same period and the total loss to mankind has been estimated as high as seventy-five millions.¹

THE PLAGUE OF CONSTANTINOPLE.

Passing backwards to the period of the decadence of the Roman empire, we find that one of the most destructive visitations of the plague occurred in the sixth century. It broke out at Constantinople during the reign of Justinian in the year 542. It was well described by Procopious, who is supposed to have been a physician on account of his use of technical medical terms; yet it must be remembered that terms now considered technical were in Greek common and popular. Gibbon, in his magnificent way, has given a summary of Procopius' account, in his *Decline and Fall of the Roman Empire*. I here condense Gibbon's narrative, omitting all extraneous conjectures and hypotheses.

"The fatal disease," says the great historian, "which depopulated the earth in the time of Justinian, and his successors first

1. Whoever wishes to pursue the subject in detail may consult Hecker's *Epidemics of the Middle Ages*, translated and published by the Sydenham Society, in 1844.

appeared in the neighborhood of Pelusium, between the Serbonian Bog and the eastern channel of the Nile. From thence, tracing as it were, a double path, it spread to the east, over Syria, Persia and the Indies, and penetrated to the west, along the coast of Africa and over the continent of Europe. In the spring of the second year Constantinople, during three or four months, was visited by the pestilence The infection was sometimes announced by the visions of a distempered fancy, and the victim despaired as soon as he had heard the menace and felt the stroke of an invisible spectre. The order of funerals and the right of sepulchres were confounded; those who were left without friends or servants lay unburied in the streets, or in their desolate houses; and a magistrate was authorized to collect the promiscuous heaps of dead bodies, to transport them by land or water, and to inter them in deep pits beyond the precincts of the city. Those salutary precautions to which Europe is indebted for her safety were unknown to the government of Justinian. No restraints were imposed on the free and frequent intercourse of the Roman provinces; from Persia to France the nations were mingled and infected by wars and emigrations; and the pestilential odor which lurks for years in a bale of cotton¹ was imported, by the abuse of trade, into the most distant regions. The mode of its propagation is explained by the remark of Procopius himself, that it always spread from the sea coast to the inland country; the most sequestered islands and mountains were successively visited; the places which had escaped the fury of its first passage were alone exposed to the contagion of the ensuing year. The winds might diffuse that subtle venom; but unless the atmosphere be previously disposed for its reception, the plague would soon expire in the cold or temperate climates of the earth. Such was the universal corruption of the air, that the pestilence which burst forth in the fifteenth year of Justinian was not checked or alleviated by any difference of the seasons. In time its first malignity was abated and dispersed; the disease alternately languished and revived; but it was not till

1. There could be no better commentary on resistance of quarantine by the cotton merchants of Memphis in 1879.

the end of a calamitous period of fifty-two years that mankind recovered their health, or the air resumed its pure and salubrious quality. No facts have been preserved to sustain an account, or even a conjecture, of the numbers that perished in this extraordinary mortality. I only find that, during three months, five and at length ten thousand persons died each day at Constantinople; that many cities of the East were left vacant; and that in several districts of Italy the harvest and vintage withered on the ground. The tripple scourge of war, pestilence and famine, afflicted the subjects of Justinian; and his reign is disgraced by a visible decrease of the human species, which has never been repaired in some of the fairest countries of the globe."

Gibbon, in a foot-note, discussing a phrase of Procopious giving the amount of mortality, says that one hundred million would be "a number not wholly inadmissible."

THE PLAGUE OF ATHENS.

I cannot abandon this retrogressive historical sketch, without going back another thousand years to the plague of Athens, in the time Thucydides. A few strokes of the master pencil of the great Greek historian will place the pestilence vividly before our eyes. Before "the plague first began to show itself amongst the Athenians, it was said to have previously lighted on many places, about Lemnos and elsewhere. Such a pestilence, however, and loss of life as this, was nowhere remembered to have happened. It is said to have first begun in the part of Æthiopia above Egypt. and to have come down into Egypt, and Libia, and the greatest part of the king's territory. On the city of Athens it fell suddenly, and first attacked the men in the Piræus; so that it was even reported by them that Peloponnesians had thrown poison into the cisterns; for as yet there were no fountains there. Afterwards it reached the upper city also; and then they died much more generally. . . . The character of the disorder surpassed description; and while in other respects also it attacked every one in a degree more grievous than human nature could endure, in the following way, especially, it proved itself to be something different from any of the diseases

familiar to man. All the birds and beasts that prey on human bodies, either did not come near them, though there were many lying unburied, or died after they had tasted them. As a proof of this, there was a marked disappearance of birds of this kind, and they were not seen either engaged in this way, or in any other; while the dogs, from their domestic habits, more clearly afforded opportunity of marking the result I have mentioned. . . . The disease, then, . . . was in its general nature such as I have designated. . . . Some died in neglect, others in the midst of every attention. And there was no one settled remedy . . . What did good to one did harm to another. . . . It seized on all alike, even those that were treated with all possible regard to diet. But the most dreadful part of the whole calamity was the dejection felt whenever people found themselves sickening; for by immediately falling into a feeling of despair, they abandoned themselves much more certainly to the disease and did not resist it; and from the fact of their being charged with infection by attending on one another, and so dying like sheep. And it was this that caused the greatest mortality amongst them. . . . In addition to the original calamity, what oppressed them still more was the crowding into the city from the country, especially the new comers. For as they had no houses, but lived in stifling cabins at the hot season of the year, the mortality amongst them spread without restraint; bodies lying on one another in the death-agony, and half-dead creatures rolling about in the streets and around all the fountains, in their longing for water. The sacred places also in which they had quartered themselves, were full of the corpses of those that died there in them, for in the surpassing violence of the calamity, men not knowing what was to become of them, came to disregard everything, both sacred and profane, alike. And all the laws were violated which they before observed respecting burials; and they buried them as each one could. And many from want of proper means, in consequence of so many of their friends having already died, had recourse to shameless modes of sepulture; for on the piles prepared for others, some, anticipating those who had raised them, would lay their own dead relative and set fire to them; and others, while the

body of a stranger was burning, would throw on the top of it the one they were carrying, and go away.

"In other respects also the plague was the origin of increased lawless conduct in the city. For deeds which formerly men hid from view, so as not to do them just as they pleased, they now more readily ventured on; since they saw the change so sudden in the case of those who were prosperous and quickly perished, and of those who before had nothing, and at once came into possession of the property of the dead. So they resolved to take their enjoyment quickly, and with a sole view to gratification, regarding their lives and their riches alike as things of a day." . . .

It may be observed that Niebuhr mentions similar epidemics in Italy, both in his *Roman History* and in his *Lectures on Ancient History*. Diodorus discusses the causes of the pestilence in the countries where it originated.

It is noteworthy that Socrates escaped the Athenian plague, probably on account of his temperance, vigor of constitution, and above all on account of his equipoise of mind and steady courage. In fact, much greater courage is required to face the plague than to face the fiercest battle that ever was fought.

EXPERIENCE OF THUCYDIDES.

But, what is the plague? To use an idiomatic phrase of the people, how are they "handled" who have it? I have never seen a case of it, and can give nothing from experience. Our best living medical writers have never seen it and describe it only from the accounts of others. As we are, then, dependent on witnesses for a description, it seems to me altogether rational that we should call eye-witnesses. Thucydides not only saw it, but had it. He can tell us something about it from experience as well as observation. Besides, he is one of the brightest intellects that ever flashed upon the world. His powers of condensed and accurate narrative have charmed the cultivated portion of mankind for more than two thousand years. We will, therefore, call Thucydides, in preference to his learned contemporary, Hippocrates, who is justly styled the father of medicine.

He testifies: "I shall only describe what was its character; and explain those symptoms by reference to which one might best be enabled to recognize it through this previous acquaintance, if it should ever break out again; for I was both attacked by it myself, and had personal observation of others who were suffering with it. That year then, as was generally allowed, happened to be of all years the most free from disease, so far as regards other disorders; and if any one *had* any previous sickness, all terminated in this. Others, without any ostensible cause, but suddenly, while in the enjoyment of health, were seized at first with violent heats in the head, and redness and inflammation of the eyes; and the internal parts, both the throat and the tongue, immediately assumed a bloody tinge, and emitted an unnatural and fetid breath. Next after these symptoms, sneezing and hoarseness came on; and in a short time the pain descended to the chest, with a violent cough. When it settled in the stomach, it caused vomiting, and all the discharges of the bile that have been mentioned by physicians succeeded, and those accompanied with great suffering. An ineffectual retching also followed in most cases, producing a violent spasm, which in some cases ceased soon afterwards, in others much later. Externally the body was not very hot to the touch, nor was it pale; but redish, livid and broken out in small pimples and sores. But the internal parts were burnt to such a degree that they could not bear clothing or linen of the very lightest kind to be laid upon them, nor to be anything else but stark naked; but would most gladly have thrown themselves into cold water if they could. Indeed many of those who were not taken care of did so, plunging into cisterns in the agony of their unquenchable thirst: and it was all the same whether they drank much or little. Moreover, the misery of restlessness and wakefulness continually oppressed them. The body did not waste away so long as the disease was at its height, but resisted it beyond all expectation; so that they either died in most cases on the ninth or seventh day, through the internal burning, while they had still some degree of strength; or if they escaped, then, after it had further descended into the bowels, and violent ulceration was produced in them, and intense diarrhoea had

come on, the greater part were afterwards carried off through the weakness occasioned by it. For the disease, which was originally seated in the head, beginning from above, passed throughout the body; and if any one survived its most fatal consequences, yet it marked him by laying hold of his extremities; for it settled on the pudenda, and fingers, and toes, and many escaped with the loss of these, while some also lost their eyes. Others, again, were seized on their first recovery with forgetfulness of every thing alike, and did not know either themselves or their friends."

Here we have some of the symptoms of intense typhoid, some of the symptoms of typhus, one or two of the symptoms of cholera, but there are other symptoms incompatible with any of these diseases. All of the symptoms are compatible with the plague. Thucydides does not mention either carbuncles or buboes, which are characteristic of the epidemics of plague in the Middle Ages. Curtius, in his remarkable History of Greece, emphatically calls the Athenian pestilence a malignant type of typhoid fever. The swift effect on birds of prey, and dogs, that come in contact with the dead, mentioned by Thucydides, is to my mind decisive. The intense thirst, is characteristic of plague. Liebermeister, following Hecker, Haeser, Hirsch, and Griesinger, speaks of it as a leading symptom. Headache, nausea, vomiting, diarrhoea, "a well-formed typhous condition," are also spoken of by the eminent German pathologist in the symptomatology of plague. Liebermeister also says that the buboes are "sometimes so small that they can be found only after a careful search," hence the great historian may easily have overlooked them. Thucydides also speaks of the disease at Athens as something entirely new and strange. We gather from the medical writers of antiquity that the disease which we call typhoid fever was well known: it could not have produced such wholesale mortality as the Athenian pestilence; could not, in short, have given rise to the appalling narrative of so cool a historian as Thucydides. If the disease was not plague, it was petechial typhus, and not typhoid fever. It ran its course too quick for typhoid, and the coolness of the skin, in the first stage of the disease, men-

tioned by the historian, is inconsistent with typhus, while it is characteristic of plague.

THE TESTIMONY OF GIBBON.

Our next witness shall be the great English historian, Gibbon. I call him because he furnishes an admirable summary of the observations and experience of Procopius and Evagrius, whose works I have not time to hunt up and examine. I know it is second-hand testimony, but it is the very highest of its kind. Having in mind Thucydides and a poetical description of the Athenian plague by Lucretius, the incomparable author of the *Decline and Fall*, closely following Procopius, thus describes the symptoms of the great Justinian epidemic: "The greater number, in their beds, in the streets, in their usual occupation, were surprised by a slight fever; so slight, indeed, that neither the pulse nor the color of the patient gave any signs of the approaching danger. The same, the next, or the succeeding day, it was declared by the swelling of the glands, particularly those of the groin, of the armpits, and under the ear; and when these buboes or tumours were opened, they were found to contain a *coal*, or black substance, of the size of a lentil. If they came to a just swelling or suppuration, the patient was saved by this kind and natural discharge of the morbid humour; but if they continued hard and dry, a mortification quickly ensued, and the fifth day was commonly the term of his life. The fever was often accompanied with lethargy or delirium; the bodies of the sick were covered with black pustules or carbuncles, the symptoms of immediate death; and in the constitutions too feeble to produce an eruption, the vomiting of blood was followed by a mortification of the bowels. . . . Youth was the most perilous season, and the female sex was less susceptible than the male; but every rank and profession was attacked with indiscriminate rage, and many of those who escaped were deprived of the use of their speech, without being secure of a return of the disorder. The physicians of Constantinople were zealous and skillful; but their art was baffled by the

various symptoms and pertinacious vehemence of the disease."

AN EYE WITNESS.

Boccaccio describes the plague with a facile hand, giving the results of his sad observations, and, as he was writing for those who were perfectly familiar with it, we may conclude that his account is accurate as well as vivid. "Different," he says, "from what it had been in the East, where bleeding from the nose is the fatal prognostic, here there appeared certain tumors in the groin, or under the arm pits—some as big as a small apple, others as an egg—and afterwards purple spots in most parts of the body; in some cases large and but few in number, in others less and more numerous, both sorts the usual messengers of death. To the cure of this malady, neither medical knowledge nor the power of drugs was of any effect; whether because the disease was in its own nature mortal, or that the physicians (the number of whom, taking quacks and women pretenders into account, was grown very great) could form no just idea of the cause, nor consequently ground a true method of cure; whichever was the reason, few or none escaped; but they generally died the third day from the first appearance of the symptoms, without a fever or other bad circumstance attending."

Guy de Chauillac describes the symptoms of the plague, observed at Avignon, as follows: "The pestilential breath of the sick, who expectorated blood, caused a terrible contagion far and near; for even the vicinity of those who were affected was certain death; so that parents abandoned their infected children, and all the ties of kindred were dissolved. After this period, buboes in the axilla and in the groin, and boils over the body, made their appearance; but it was not until seven months afterward that some patients recovered with buboes, as in the ordinary milder forms of plague."

EXPERIENCE OF AN OLD ENGLISH PHYSICIAN.

Dr. Hodges, who practiced in London during the great plague of 1665, has left a valuable description of the pestilence, mixed up with the whimsical pathological notions of his times. Dr. Copland thus summarizes his observations: "The manifest signs of infection,

he states to be horror, vomiting, dizziness, delirium, headache, and stupefaction. The appearances after infection are fever, watching, palpitation of the heart, bleeding at the nose, and great heat above the praecordia, all which may occur in other pestilences, but in this they are conjoined with those which are peculiar to it, as pustules, commonly called blains, buboes, carbuncles, spots, marks, or tokens."

Mr. Jackson, an eye-witness, describes the symptoms of the plague which devastated Morocco at the close of the last century as follows: "It attacked some with a sudden and violent shivering, others with a sudden delirium, succeeded by unquenchable thirst. Cold water was eagerly resorted to by the unwary, and proved fatal to those who indulged its momentary relief. Some had one, two, or more buboes, which formed and became as large as a walnut in the course of a day; others had a similar number of carbuncles; others had both buboes and carbuncles, which generally appeared in the groin, under the arm, or near the breast. Those who were affected with shivering, having no bubo, carbuncle, spots, or any other external disfiguration, were invariably cut off in less than twenty-four hours, and the body became quickly putrified, so that it was indispensably necessary to bury it in a few hours after dissolution."

This description recalls, in some of its important features, Thucydides and the plague of Athens.

MISCELLANEOUS WITNESSES.

It is not necessary to pursue this branch of the subject much further. These pictures of the terrible pestilence, presented from a few writers of ancient and modern times, most of whom drew on their own observation and experience, will serve to give a clear notion of what the plague is. I might quote more pathologically accurate descriptions of the plague from Dr. Gaetani who, as first physician to the Viceroy of Egypt, had experience of the disease in the epidemic of 1835; from Dr. Morpurgo, who resided eight years in Egypt, Syria and Turkey, and observed it in the Turkish epidemic of 1837; from Baron Larey and Dr. Sotira who were with the French army in Egypt at the beginning of the present century;

from Sir James M'Grigor, physician to the Indian army in Egypt; from Samolowitz, who had large experience of the plague in Poland, Moldavia and Walachia, and was in the epidemic of Moscow; from Dr. Mackenzie, who was in Constantinople twenty years and saw the great epidemic of 1751, when 150,000 perished in that city; from Dr. Russell, who had wide experience of the pestilence in Syria during many years in the middle of last century; from M. Gosse, who saw and described the disease in Greece in 1827 and 1828; from M. Rigaud, who, as physician to the hospital at Alexandria, examined the bodies of sixty-eight persons who had died with the plague; and from many others whose reports are published in the rich transactions of the Royal Academy of Medicine, at Paris, or in the transactions of other learned societies of Europe; and if I were within reach of a great library, I might quote from the writings of Avicenna and other Arabian medical writers, whose experience was vast, whose descriptions have the warm coloring of the Orient; I might go back twenty-five centuries and copy an account of the real bubo plague taken by Oribasius from an earlier writer; might refer to Manetho, the Coptic historian, who speaks of "a very great plague" in the reign of Semempses, the seventh king of the first dynasty of Egypt, 2,500 years before Christ; might explain by natural law "the botch of Egypt" and the terrible warning of the Pentateuch—"And I will bring a sword upon you, that shall avenge the quarrel of my covenant, and when ye are gathered together within your cities, I will send the pestilence among you, and ye shall be delivered into the hand of the enemy"—but little could be added to the ghastly splendor of Thucydides, to the lurid magnificence of Gibbon, to the dainty cadaver hues of Boccacio.

IS IT "CATCHING?"

There is no doubt that plague is contagious and infectious, that it is communicated from person to person, and from contaminated substances. Some have indeed denied this, as there are those who even deny that small-pox is contagious. Such skepticism has no weight against the general experience and judgment of mankind. Dr. Hennen who investigated, in the most thorough manner, the in-

introduction and propagation of plague in the epidemic of Malta, in 1813, very pertinently says: "It has been among medical men, I am sorry to say, that doubts have principally arisen as to the contagious nature of plague. This gross and dangerous error, in point of fact, has sprung from that most fruitful source of deception—preconceived theory; and it has been aggravated by neglecting to define the terms employed, which is altogether inexcusable, and which has exposed us to no small portion of ridicule among the better-informed non-professional men who have interested themselves on the subject." I have before me, as I write, a cloud of witnesses, professional and non-professional, all of them speaking from personal observation, whose testimony is concurrent, not only as to the contagiousness of plague, but also as to the fact that the disease is continuous, that is, spreads from human intercourse and is not propagated by atmospheric and other conditions. Mr. Jackson, already quoted as to the symptoms of the plague, who resided at Mogadore, during an epidemic in that city, says in his account of the Empire of Morocco, that the plague is "caught solely by touching infected substances, or by inhaling the breath of those who are diseased." He denies "that the cultivation of a country, the draining of the lands, and other agricultural improvements, tend to eradicate or diminish the plague; but we have seen countries depopulated where there was no morass or stagnant water for many days' journey, nor even a tree to impede the current of air, or a town, nor anything but encampments of Arabs, who procured water from wells of great depth, and inhabited plains so extensive and uniform as to resemble the sea."

THE BLACK DEATH.

It should perhaps be remarked that Hirsch, the incomparable historian of epidemic diseases, inclines to the opinion that the Black Death of the fourteenth century and the Pali plague that prevailed in certain provinces of India from 1815 to 1821, is a distinct disease. He speaks of the pestilence described by Boccaccio as "that frightful epidemic of the plague which was known under the name of Black Death, and which fills one of the darkest pages

in the history of the human race. Its name still lives in the mouths of the people, fills their minds with horror, and was the most terrible scourge which man has ever seen." But the best pathologists of modern times, do not agree with him. Hirsch founds his opinion upon the fact that in the Black Death there was a lung complication and profuse spitting of dark blood. "The majority of authors," says Liebermeister, "are inclined to identify the black death with the real bubo plague, and to look upon the lung affection as an accidental complication."

WHERE DOES IT BEGIN ?

The plague is said to be autochthonous to the Asiatic and African regions about the eastern end of the Mediterranean sea, as the yellow fever is to the shores about the Mexican gulf. Being indigenous there, it always lingers in those countries in an endemic form. It is especially dangerous to the rest of the world only when it becomes epidemic and spreads wherever its contagion reaches human beings. The plague of Athens was mild, in comparison with the terrible Justinian plague. The so-called great plague of London, which destroyed 100,000 out of a population of half a million, was very mild, in comparison with the frightful epidemic of the fourteenth century, which killed half the people of Great Britain, and was equally fatal over the continent of Europe.

The origin of the plague is really unknown. I have no space left, neither would it be profitable, to discuss here the different theories of its origin that have been entertained. It belongs to a class with typhoid fever, typhus fever, yellow fever, diphtheria, malignant dysentery, and cholera. It is far more fatal than any of these, for nine out of ten who are attacked with it die. Its mode of propagation is a problem as yet unsolved. Pathological inquiries, pursued with the skilled use of the microscope, are now rapidly tending to establish the doctrine of a *contagium vivum* for every disease. For example, it has been shown by Koch, Cohn, and Tyndall, that the deadly splenic fever is caused by a microscopic plant. Hallier and Klob have discovered the microscopic fungi that may cause cholera. Oertel, Hueter, Recklinghausen, Waldeger, Klebs, Eberth, Heiberg,

Virchow, Massiloff, Trendelenberg, Tommassi, and Cohn, have demonstrated the existence of vegetable parasites, so small as to be on the borders of the visible, as the cause of diphtheria. Basch claims that he has found micrococci in dysentery. Salsbury was sure that he discovered a microscopic organism in malaria. It was discovered by Obermeier of Berlin, and the discovery was experimentally confirmed by Heydenrich of St. Petersburg, that relapsing fever is caused by minute spiral organisms in the blood, which may be transplanted by inoculation, which may be propagated from seeds. But where do these organisms come from? If the theories of Salsbury and Basch are true, the microscopic parasites that cause malarial fevers and dysentery grow in decaying vegetable matter and may be transplanted to the human body. The "bacterium termo" that is transplanted to the throat in diphtheria and may be passed from person to person, increasing as it goes, probably has its origin in the decomposing excreta of hog-pens, cattle-stalls, and vaults or sewers. The organisms of yellow fever probably spring up about shipping, at the edge of tide water, in a tropical climate. The fungi of typhoid fever probably flourish best in human excreta in a state of putrefactive decay. The organisms of typhus fever probably grow where human beings are packed into unventilated spaces and enrich the atmosphere with effluvia from their unwashed bodies. The microscopic cholera plant, an Indian saprophyte, probably flourishes in the polluted camps of Asiatic pilgrims. The traditions of centuries suggest the hypothesis that the microscopic organisms causing the plague grow and flourish where rotting in moist heated air lie unburied the corpses of those who have been slain in war or have perished in famine. A vegetable organism multiplies itself through cheese and we call it "mould." A vegetable organism multiplies itself through the pores of solid timber and we call it "day rot." A vegetable organism, the yeast plant, rapidly multiplying itself, produces a fever in dough and we call it the raising of bread. The mould of the unburied or half-buried dead, in the great charnel house of want and strife, in the edying centre of the densely populated Eastern Hemisphere, invades the living and we call it plague. A year or two ago came a wail from the South

American Continent, that in a region stricken with famine, where the helpless living could not bury the unnumbered dead, the genuine bubo plague, the Black Death, had broken out *de novo*. If the yellow fever should recur with increased violence, so that its victims must remain under a southern sun without sepulture, we might have the plague springing up on our own soil.

The experience of the world proves that there is no remedy for the plague. Therapeutical science stands helpless in its avenging presence. The only thing that can be done is to sustain the afflicted with mental and physical stimulants, thus enabling them per chance to battle with the disease successfully to the end.

The most important means of security against the plague is to shut it out and give it no filth to feed on. It is dangerous to the world at large only when it becomes epidemic. It is a good thing for America that Europe, with the experience of ages, with matured skill in quarantine, stands between us and the infected East. Our Pacific coast is really in more danger than the Atlantic. The great depopulating Black Death of the fourteenth century invaded Europe from the side of China. The Mongolians befoul everything they touch, even the plague itself. Asiatic nations have no sanitary science, no quarantines, to prevent the spreading of plague to the celestial empire, whence it may come, moving eastward till East becomes West, and lay its cold cadaver fingers on the city by the golden gate. Watchful quarantine and active sanitation, if the nation is wise in season, will save us from a calamity such as made Pope Clement a spectacle of terror to Europe and broke the hard heart of Justinian.

SANITARY LEGISLATION AS THE BASIS OF SANITARY ADMINISTRATION.

“Sanitary science has had for its first stage simple ignorance and apathy; next, its stage of empiricism and half-knowledge, in which stage it is very much at present; the common result of expensive, misfitting, inefficient and wasteful work; with water distribution which makes good supplies bad, and bad supplies worse; with water carried into houses without the means of removing fouled and waste water, aggravating the evils of damp and of excrement-sodden sites; sewers without adjustment to the house drains; intended arteries without relation to the capillaries of the system, leaving undiminished death rates, serving to encourage the sinister objection that sanitation is of no avail; and lastly, it has the stage of science, of complete knowledge, of unity, efficiency and economy, tested by reduced death rates.”—MR. EDWIN CHADWICK, in his Address on Health, before the British Science Association, 1877.

SANITARY LEGISLATION AS THE BASIS OF SANITARY ADMINISTRATION.

It is not necessary to demonstrate here that sanitation, the application of medical science to improve the conditions of health and life, has contributed to increased longevity in all the civilized communities of the world. Much has been done by the increase and diffusion of knowledge. More remains to be done by the same means. Legislation follows and the State extends the dominion of law over the territory conquered from disease and death.

The State, upon the legitimate ground of public economy and self-preservation, takes charge of the primary education of the people. It therefore determines what secular knowledge shall be taught in the common schools. It may, and properly should, add the simple and ascertained laws of health and public hygiene, to reading, writing, grammar, geography, arithmetic and history of the country. It is more important to the children to learn that water from the school-house well, only a few feet from the privy, is quite as dangerous to them as a mad dog lurking in the neighborhood, or that foul air in the unventilated school-room is likely to cause their poor mothers watchful nights and may bring dreaded and costly visitations of the doctor, as it is to learn to cipher, parse, name the rivers of Africa, or bound an unknown state with unpronounceable name in the centre of Asia. It touches a good father's pride and makes his dear wife happy, to know that their children are improving at school, but health is the incomparable blessing of the household and is more highly prized than learning. Give the citizen a plain

and sensible reason for such teaching, and not a mere professional and mysterious decree, and he will not only cooperate with the State but grow more thankful for the the enlightened government under which he lives. Hence it is profoundly true that we must depend upon the governing agency, upon the enactment of wise law and its prudent administration for anything like a general diffusion of sanitary knowledge. It is a disgrace to our higher institutions of learning that they are still neglecting sanitary science. It is a sad sight to see the young men and the young women from the first American families, at colleges and seminaries, surrounded with costly appliances for learning all the sciences under the sun but the one science that reveals to them how to avoid breathing, drinking, even eating their own excreta, So far as the State touches such institutions let reform be inaugurated by the enactment and unflinching administration of sanitary law.

Nothing so closely concerns political economy, or the material welfare of a nation, as the proper sanitation of the people. It would not be difficult under properly coordinated and efficiently administered national and state sanitary codes to lessen the mortality of the people by at least four in the thousand. The same thing may be expressed in language so axiomatic as to be even tautological:—preventible diseases may be prevented by the vigorous and intelligent interference of the State to the extent of reducing the annual death-rate by four in the thousand. In our population of fifty millions, there are more than one million of deaths every year. At least two hundred thousand of these deaths are preventible by sanitation. To turn our eyes from sickness and sorrow, from the great sea of heart-ache among the people, and to look coldly on the ledger of public prosperity, we find that these two hundred thousand preventible deaths mean a vast sum of money. For every death there are more than twenty cases of sickness. The doctor, the apothecary, the undertaker, and grave digger cost hard cash. The productive industry of a sick member of community ceases during illness. The fruitful toil of the dead ceases forever. Skilled and reliable workers in statistics cipher out for us that each death from preventible disease means, directly and indirectly, in the

ways here indicated, a loss of one thousand dollars. The two hundred thousand preventible deaths in the nation every year represent an annual public loss of two hundred million dollars. Ten per cent of such loss would defray the expense of carrying out in minute administrative detail a complete system of sanitation for the whole country. Instead of exaggerating, I purposely make estimates that none can dispute.

It is time for the translation of sanitary science into law. This is a new and fertile field for great and enlightened statesmen. The people quickly learn to appreciate what really brings them good. The one guiding principle in such a transition is that only the undisputed conclusions of sanitary science, not sanitary theories, should be enacted in a clear code, with simple, easily comprehensible, just, impartial, and economic modes of administration. Cleanliness and healthfulness impose few burthens and enhance the value of everything which they touch. As Dr. Richardson beautifully says: "A change has come over the science of medicine; with nobleness of purpose, true medicine has been the first to strip herself of all mere pretences to cure, and has stood boldly forth to declare, as a higher philosophy, the prevention of disease. The doctrine of absolute faith in the principle of prevention includes the existence of a higher order of thought, of broad views on life and health, on diseases and their external origin, of death and its correct place in nature."

Owing to the peculiar and complex form of our government, sanitary law must be dual in form and administration, while maintaining unity of purpose. In other words, we must have a national code and state codes. The aim of both will be to increase the power and prosperity of the people by enforcing regulations to protect them from preventible causes of sickness and death. We have a few very good municipal sanitary codes (those of New York and Milwaukee are notably the best,) but the statutes of states and of the United States contain a very limited number of enactments designed to protect the public health. We are far behind Great Britain in this respect, where special Acts of Parliament, for the last quarter of a century, have elevated the conclusions of sanitary

science into the realm of law. The British people are already reaping therefrom a rich harvest of practical benefit.

It is well enough to point out the way in which a national sanitary code and state sanitary codes may be secured and to indicate what mutually sustaining administrative methods should be adopted.



I. OUTLINES OF A PLAN FOR A NATIONAL HEALTH DEPARTMENT.

In my judgment, there should be established a health department of the national government, to be presided over by a Secretary of Public Hygiene, who should be a cabinet officer. Within such a department there should be

- I. A Bureau of National Quarantine;
- II. A Bureau of Maritime Hygiene;
- III. A Bureau of Military Hygiene;
- IV. A Bureau of Hygiene of Commerce;
- V. A National Laboratory;
- VI. A Bureau of the Hygiene of National Buildings and Places;
- VII. A Bureau for the Investigation of Epidemic Diseases of Men and Animals.

NATIONAL QUARANTINE.

In a comprehensive national sanitary code a distinct chapter should be devoted to quarantine, both maritime and inter-state.

(1.) Maritime quarantine ought to be in the hands of the Federal Government. There is no constitutional reason why the United States should not establish maritime quarantine wherever custom houses are established. Quarantine of any port of entry touches the sanitary interest of the whole country. For example, Boston is not a port of Massachusetts alone, but of the whole United States. New Orleans is a port of the entire country, and not of Louisiana alone. Every port at which an infected ship may arrive belongs to the nation. It may not be constitutional for the

general government to say to a State that it shall not have a quarantine system, but the general government has a right to establish its own quarantine at any point which is in maritime relation with the country at large and with foreign nations.

(2.) An inter-state quarantine system could at first be only tentative. It would necessarily have to be the growth of time and experience; in other words, it would finally be shaped, to a great extent, by conflicts of state and national laws. The highest judicial tribunal would settle such conflicts and make a practical system a beneficent reality. The power is clearly conveyed in the constitution, to regulate, restrain or prohibit, the movement of infected persons and the transportation of infected merchandise from State to State. Congress has already exercised this power, by the Act of March 3, 1873, "To prevent cruelty to animals while in transit, by railroad or other means of transportation, within the United States." Still more reasonably may Congress exercise this power to protect the life and health of the people. If the Federal Government can interfere to prevent cruelty to animals, it certainly can interfere to prevent transportation of infected animals. If it can interfere to prevent suffering to a steer, it can interfere to prevent death to a man.

In my judgment, a national maritime quarantine code should be founded on the admirable system of New York, with such flexible variations as climate and the exigencies of particular localities might require. When we come to look upon the people of the United States as a whole, with equal rights, equal duties, equal privileges, instead of looking at them as divided up into sections by accidental territorial lines, we shall find it easier to adopt measures for the general good.

MARITIME HYGIENE.

Every vessel carrying the American flag should be under the sanitary supervision of the general government. Merchant ships should be required to conform to proper regulations for preserving the health of sailors and passengers. Questions of food, ventilation, cleanliness, etc., are just as vital on the water as on the land. The

Federal Government alone has power to enforce sanitary regulations on board ships which are registered and sail under its authority. Seamen and travelers have a right to be protected, in health and life, against ignorance, negligence and avarice, by the nation under whose flag they commit themselves to vessels sailing on rivers, lakes and oceans. Frequent inspection by officers empowered to enforce sanitary regulations can alone secure such a desirable end.

The naval service of the United States needs sanitary supervision. Every medical officer in the navy should have ample knowledge of hygiene. Without such knowledge, no applicant should be commissioned at all. And such medical officer, within his own province, should have undisputed authority.

In a well regulated system, there could be interchange of duties, without conflict, between the sanitary agents of the quarantine and maritime bureaus.

MILITARY HYGIENE.

The Surgeon General of the army might be, *ex-officio*, the head of a bureau of military hygiene. And the surgeons of the army should be sanitary inspectors. Only it would be necessary to require of each army surgeon thorough knowledge of preventive medicine. The sanitary code for the army should be rigid and strictly enforced. Even in time of war, more die in camp than in battle. If any men on earth are entitled to good sanitary care it is those who are ready to die for their country. Like the surgeon in the navy, the army surgeon should have supreme authority in his own province and should also be held responsible for its exercise.

HYGIENE OF COMMERCE.

It is a conceded and well-known fact that various articles of manufacture, in common use among the people, are adulterated in such a way as to make the same dangerous to health and life. Poisonous dyes are used to color fabrics worn for clothing. Arsenical and lead pigments are wickedly employed to make candies look attractive to children. Canned fruits and meats are poisoned by lead. Sugars are poisoned by muriate of tin used in

the process of refining. Wall-papers and toys are not unfrequently colored with compounds of arsenic. Dangerous drugs are used in the manufacture of beers and in the "doctoring" of wines. But it is not necessary to multiply examples.

With the question of dangerous adulterations of various articles of commerce, local health authorities are unable to deal in an efficient and comprehensive way. Retail tradesmen are for the most part innocent or helpless. The manufacturers are generally to blame. They might be reached directly by State authority, but legislatures are reluctant to enact laws that would only drive industries to other jurisdictions which may be more negligent and apathetic. Individuals, beset by universal evils, are quite helpless. It requires the power of a nation to cope with a danger of such magnitude.

The general government, by exercising its constitutional authority to regulate commerce, can prohibit the importation, the exportation and the inter-state transportation of all articles which jeopardise the life and health of the people. If such articles were made by Act of Congress liable to seizure in transitu, to confiscation and destruction, they would soon cease to be manufactured and would disappear from commerce. The consignor, the carrier, and the consignee of such goods should be penally responsible when proved to have criminal knowledge of their character. It might not be possible for the national government to reach the manufacturer located within the jurisdiction of a state, but it could prevent him from extending his murderous trade to the country at large. A single seizure of his poisoned goods as soon as they crossed a state line and came under the jurisdiction of the national authority would advertise his nefarious business to its death. No foreign manufacturer would send unwholesome goods to this country if they were liable to ignominious destruction after their arrival. Such goods would not be manufactured for foreign markets, if they were liable to inspection, seizure, and destruction, before the cargo could obtain clearance. If under international law poisoned goods designed for human use are not contraband of commerce, then pirate ships have a right to sail the seas.

The manufactures of the nation inaugurating such a system would be at a premium throughout the commercial world. After the first great step had been taken by the national power, states would find it easy to complete the good work within their own borders. The result would be improved commerce, protection to life and health, and a reflex education of the people to honest ways.

United States marshals and custom-house officials might cooperate with the experts of a Bureau of the Hygiene of Commerce. The wise and efficient sanitary regulation of the vast and increasing inter-state transportation of animals for human food would of itself be a subject worthy the undivided attention of a great and philanthropic statesman.

A NATIONAL LABORATORY.

Intimately connected with the preceding bureau should be established a fully equipped laboratory, in which a necessary number of the best chemists and microscopists of the nation should be permanently employed. Samples of all goods seized for poisonous adulteration should there be carefully examined. Examinations made in the national laboratory should not be legally conclusive. Constitutionally they could not be. No person under our government can be deprived of liberty or property without due process of law. The experts of the national laboratory could prepare the evidence for the government, to be used in a fair trial before the courts. The public analysts would very properly be brought face to face with other eminent scientists in the arena of impartial justice. Legal tribunals would prevent the possible exercise of tyranny.

Such a bureau might undertake experiments in the interest of sanitary science, which would be beyond the reach of private investigators. Rivalry between public and private analysts would stimulate research.

HYGIENE OF PUBLIC BUILDINGS AND PLACES.

Tens of thousands of citizens are employed by the general government in its civil service. Federal legislators, judges, custom-house officers, postmasters, heads of departments, and other

dignitaries, must occupy such buildings as the government supplies. Regiments of clerks, in various places, toil for the people in rooms which not unfrequently are ill ventilated, badly warmed, over crowded, or infected with the gases of decomposing filth. It is bad economy in the nation to subject its servants to unwholesome conditions. Congressmen, slowly dying with polluted air in the capitol, sometimes utter contemptuous language against public hygiene, while they are trembling on the verge of the grave as victims of sanitary apathy. Nearly every public building in Washington is a costly monument to hygienic negligence, indifference, or ignorance. Many millions have been spent by the Federal Government upon imposing structures in other cities, which, so far as healthfulness is concerned, are a national shame. A bureau presided over by a sanitarian learned in the difficult science and more difficult art of ventilation, and practically skilled in wholesome ways of drainage, should have hygienic supervision of all national buildings. A nation is not wise that allows its laws to be made and administered by men whose brains are poisoned with the vapors of organic life and organic decay.

Such a bureau should comprehend the sanitary care of the District of Columbia and of territories under the exclusive dominion of Federal Law.

EPIDEMIC DISEASES OF MEN AND ANIMALS.

It cannot be supposed that official investigators will supercede great pathologists at the centres of science in the civilized portions of the world. Exact facts, however, must be collected before the causes of epidemics can be fruitfully studied. A powerful government is the best agent for coordinating the efforts of individuals and for extending skilled observation to fields beyond the reach of private means. And the governing agency alone can apply on a large scale and enforce regulations for preventing and arresting epidemics. As Dr. Alfred Carpenter says, in a very recent address before the Sanitary Institute of Great Britain: "Our domestic animals fall an easy prey to every kind of epidemic." . . . "We cannot remove disease from our midst, or reduce our death-rate much

below seventeen in the one thousand, until we can ensure a more healthy progeny among our domestic animals." Epidemics will not cease among men till they cease among the animals on which men feed. It will require the heavy hand of the Federal Government to suppress the national traffic in diseased animals and unwholesome meats.

In connection with the study of epidemics among men and domestic animals, and the enforcement of wise regulations for preventing and arresting such epidemics, this bureau of the hygienic department of the general government should undertake the systematic investigation of the causes of the unhealthiness of particular localities. It should also be charged with the revision and registration on a scientific basis of such vital statistics as may be within the reach of the government, in the present chaotic state of the nomenclature of diseases and the imperfect returns made by local authorities.

This bureau should be in cooperative relationship with the bureau of quarantine and with the trained microscopists of the national laboratory.

The Health Department of the government should issue a well edited weekly bulletin, in which the outlines of all national sanitary work, the results of all matured investigations, and the best sanitary teaching, should be given to the press of the country and to local boards in all the states.

A national sanitary code, embodying the plan here given in outline, would be a work of great magnitude. It should be the labor of several eminent men. Dr. John S. Billings might prepare the chapter pertaining to military hygiene; Dr. James L. Cabell, and Dr. C. B. White, the chapter pertaining to epidemic diseases; Dr. Vanderpoel, the chapter pertaining to quarantine; Col. George E. Waring, the chapter pertaining to public buildings; Dr. A. N. Bell and Albert L. Gihon, the chapter pertaining to maritime hygiene; Dr. Kiedzie and Dr. Squibb, the chapter on the hygiene of commerce; and Prof. Wm. Ripley Nichols and Dr. Wm. H. Ford, the chapter pertaining to the national laboratory. Many others are equally qualified for the task. The parts should be coordinated by

one master hand and the whole be submitted to purely legal revision by two great constitutional lawyers, of opposite political parties, like Senator Thurman, of Ohio, and Senator Edmunds, of Vermont.

The health minister, like the secretary of war, the secretary of the navy, the secretary of the interior, etc., would necessarily be a political appointment, subject to change, with the changes of administration. All other officers in this department, like officers in the army and navy, should be placed beyond the mutations of politics and the caprice of a cabinet chief.

The cost of such a department would be less than the cost of any other department of the national government. And every dollar spent in that direction would return ten-fold in money value, while increasing the happiness of the people. As Dr. John S. Butler admirably says: "In fairly measuring what sanitary science has done and can do for the people, we are to take into consideration all those powers, values and indeed sympathies, which are the real vital elements of the State, and which must exist in due proportion to make the best whole. We are also to take the right estimate of another element of public or State property, whose full measure of worth political economists have only of late been ready to admit, the money value of each healthy life, acknowledging the soundness of that axiom of finance as well as of political economy, that public health is public wealth."

Hand in hand with the prudent administration of a wise national sanitary code, must go on the work of the hygienic education of the people. Lord Derby, speaking from ripe experience in the government of an independent people, truly says: "No sanitary improvement worth the name will be effective, whatever acts you pass, or whatever powers you confer upon public officers, unless you can create an intelligent interest in the matter among the people at large. The State may issue directions, municipal authorities may execute to the best of their power, inspectors may travel about, medical authorities may draw up reports, but you cannot make a population cleanly or healthy against their will, or without their intelligent cooperation. This is why, of the two, sanitary instruction is even more important than sanitary legislation."

The sanitary instruction of the American people is better than that of the English people, while our government is far behind the British government in sanitary legislation. The Public Health Act of August, 1875, placed Great Britain in the van of nations, so far as State preventive medicine is concerned. America should now take the lead of her older sister, with a still more comprehensive and vitally beneficent sanitary code. "The health of the people," says the Prime Minister of Great Britain, "is really the foundation on which all their happiness and their power as a State depend. . . . The health of the people is, in my opinion, therefore, the first duty of a statesman."

We need public men who have the enlightenment and the courage to say as much and to act accordingly.

II. OUTLINES OF A PLAN FOR A STATE HEALTH DEPARTMENT.

A State legislature is supreme, except in such matters as have been delegated by the Constitution to the national government. The provisions of a state sanitary code may, therefore, be as extensive as protection to the public health may require. Good sense, reasonable prudence, and exact hygienic science, are the only things that the legislature needs to consult. Experience proves that the people are always ready to sustain measures that promote the general welfare. The public never complains of reasonable sanitary regulations. On the contrary, complaints are loud, and sometimes threatening, when nuisances are neglected and epidemics are left to multiply their victims. Show the people a sensible way of shielding themselves against things that disturb their comfort, injure their health, and threaten their lives, and they will heartily and promptly bestow the authority and contribute the means for securing a desirable end.

SANITARY DISTRICTS.

In my judgement, the State should be divided into just as many sanitary districts as there are divisions for other administrative purposes. For various reasons, the county would be the best unit for sanitation. The appointment, confirmation, and payment of health officers would then be in harmony with the election and compensation of other local officials. Of course, the districts

would vary greatly in population. But such variation would present no more difficulties in matters of sanitation than in other administrative affairs.

It may be assumed, and it often is assumed, that cities and rural districts do not require the same sanitary regulations. This is a vital mistake. The city is only an aggregate of villages, and the village is only an aggregate of houses. The isolated farmer is just as much entitled to the benefit of a skilled sanitary inspector as the inhabitant of a town. Foul air, polluted water, damp and unclean earth under the house, contagious diseases, poisoned food, all the things deleterious to health and dangerous to life, are just as much to be dreaded by the lone toiler of the country as by the busy denizen of the city. An economic cooperative plan of sanitation, through the agency of the State, should reach all alike and confer its benefits without partiality. Hence, there should be no distinction between an urban and a rural sanitary district. A drain from a farmer's kitchen involves all the hygienic principles that are required to be observed in the sewerage of a city. When you have learned how to safely and economically remove the organic waste from an isolated habitation in the country, you have learned how to keep a town clean and wholesome. If a few men in every state, imbued with the gospel of cleanliness, could go from neighborhood to neighborhood, teaching some fundamental sanitary lessons, with the tenderness of real humanity, with genuine unaffected love of their fellow men, they could save more lives than are saved by a hundred millions' worth of drugs sold in the United States every year.

AGENCIES FOR EXECUTING A SANITARY CODE.

There should be appointed by the Governor, subject to confirmation by the Senate, a sanitary commissioner for the whole State. He should be an educated physician, of high character and of marked executive ability. It should be understood from the outset that the office is not political. The tenure of office should be at least for five years, and the incumbent should give his whole time and energy to the duties of his place. He should be subject

to removal by the appointing power, for negligence, incompetency, or inaptness for the work. The compensation should be sufficient to secure the best service.

The State sanitary commissioner should appoint, subject to confirmation by the Senate, a State chemist, a State microscopist, and a secretary. These should be first-class men, capable of going on with the work of the central office in case of the temporary absence or disability of the commissioner. Their salaries should be sufficient to compensate them for continuous and active service.

The State sanitary commissioner should appoint for each county, or sanitary district, a sanitary superintendent, subject to confirmation by the local board of supervisors. These sanitary superintendents should be regularly educated medical men, of good standing and administrative capacity. Their compensation might be a sum equal to five cents a head for all the inhabitants (according to the last census) of their respective districts. Where their districts are large, they would need secretaries and other assistants whom they should pay from their own official incomes. Being responsible for such assistants they should be entrusted with their appointment, subject to confirmation by the county board of supervisors.

Sanitary superintendents should appoint, subject to confirmation by the local board of supervisors, a sanitary inspector for each ten thousand inhabitants in their respective districts. Such sanitary inspectors should receive a compensation equal to five cents from each inhabitant of their inspection districts. They could not be chosen from the medical profession, as a rule, for the compensation would not be sufficient to secure that kind of service. They should give their whole time to the work and would need to keep a horse, especially in the rural districts, to enable them to make their inspections and deliver orders from their superiors. When I come to enumerating the duties of the various grades of sanitary officers, it will be seen that intelligent mechanics, tradesmen and farmers are well adapted to the general work of sanitary inspectors.

We have, then, three grades of officers. The State sanitary commissioner, with his secretary, microscopist and chemist, would have his office necessarily at the capitol. The sanitary superin-

tendent, with his secretary and medical assistants in a large district, would necessarily have his office at the county seat. Sanitary inspectors could be located at points most convenient for their work and for reporting to their superiors.

The cost to the people of each county would be exactly equal to ten cents for every inhabitant per annum. The cost to the State at large would be the salaries of the commissioner, his secretary and the two scientific experts under his charge. To the salary expense would be added the cost of blanks of various kinds, to be distributed from the central office to the sanitary superintendents and inspectors. For a State with a million and a half of population the annual cost of a comprehensive, all-pervading health department would be about one hundred and seventy-five thousand dollars per annum. The demonstrable saving to the State, would be at least three millions each year.

We have the machinery; now let us set it in motion. I am not going to draw a sanitary bill for the State; I shall only outline the ground which ought to be covered by the different chapters.

VITAL STATISTICS.

"Statistics," says M. Tardieu, "or the numerical method, are one of the most powerful aids of the hygienist. By figures the health of a town is shown at a glance; by figures the efficacy of preventive measures, such as vaccination, is tested, and the fatality of epidemics traced." "It is impossible," says Dr. Parkes, "for any nation, or for any government, to remain indifferent when, in figures which admit of no denial, the national amount of health and happiness, or disease and suffering, is determined." By the filling of blanks furnished from the central office, it would not be difficult for the local superintendent and his inspectors to make returns of all deaths and their causes in the whole State. To such returns should be added those of marriages and births. The people should be made to cooperate, by provisions of law with proper penalties attached. The machinery of the sanitary system of the State could be relied on to execute the law, and to perform the important

functions of a registrar-general's department. I would commend to the attention of any legislator who wishes for detailed information on this point the registration law of Rhode Island.

ADULTERATION OF FOOD AND DRUGS.

Fraudulent adulteration is not a new thing under the sun. The Englishman Accum's "Death in the Pot" directed public attention to it in 1822. Blythe's "Dictionary of Hygiene and Public Health" enumerates more than a hundred articles that are commonly adulterated. The Sale of Food and Drugs Act, which was passed by the British Parliament in 1875, is the best extant law on the subject. Only last year the Legislature of Wisconsin passed a stringent measure against the adulteration of food and drugs. Our law is inoperative, because it does not provide adequate means for its administration. Hitherto, the cunning of commerce has been too much for the wisdom of legislators. A chapter of a State sanitary code on adulterations may be drawn, after the model of the British Sale of Food and Drugs Act, avoiding some of the defects that have appeared in the execution of that measure, in such a manner as to enable the public health officers to successfully combat one of the greatest dangers of our times. In this particular field the State chemist and the State microscopist would find their most important employment. It would be a part of the duty of sanitary inspectors to procure specimens of suspected articles to be sent by the local superintendents to the central office. If the general government will declare poisoned goods contraband of commerce, and if all the States will cooperate to suppress adulterations, the benefits to the people will be incalculable.

CONTAGIOUS AND INFECTIOUS DISEASES.

Outside of Milwaukee very little is done in the whole State to check the progress of communicable maladies. Scarlet fever and diphtheria spread from neighborhood to neighborhood, and no systematic effort is made to hold them in check. Small-pox lurks here and there, ready to become epidemic under favorable conditions and to gather in a loathsome harvest of victims.

Communities are sometimes startled by announcements in the newspapers, that typhoid fever has made its appearance in some village or school and is hurrying its victims to untimely graves. There is no destiny in all this. The whole class of contagious and infectious diseases may to a very great extent be controlled. Intelligent efforts at prevention are much more successful than efforts at cure. When such diseases come, every body very properly sends for a doctor and uses remedies. People would still more willingly exert themselves to keep epidemics from their households, if they were only taught how and knew what agencies to evoke.

The soil in which such diseases flourish is enriched by filth, but that is not the side of the question which I am now discussing. The richest soil will not bear a harvest of zymotic disease, or of anything else, unless the seed is sown. I am devising a plan to keep away the seed. Isolation of sporadic cases and thorough disinfection of the places where they appear are the means to prevent dissemination. The husbandman knows that the first few Canada thistles must be destroyed or they will spread all over the farm and deteriorate its value. The sanitarian knows that the first cases of small-pox, diphtheria, scarlatina, typhoid fever, typhus fever, cholera, malignant erysipelas, yellow fever, etc., must be separated from the community, or these diseases may spread over wide regions of inhabited country. The agents for administering a good sanitary code are ready at hand to do exactly that kind of work. Besides, they coordinate and direct to a common end the willing efforts of the people in the same direction. A very considerable number of citizens may know what ought to be done in such an emergency, but it will not be done, unless a legal and authoritative machinery exists, for the very purpose of doing it.

A wise code will require, under reasonable penalties, not only physicians, but also householders, to report without delay any case of contagious and infectious disease to the sanitary authority. The place where it exists should be plainly designated, by a printed placard or otherwise, so as to isolate it. The people will take care of themselves, if they only know where it is. Children from houses

where contagious and infectious diseases are should be temporarily excluded from schools. None of the inmates should attend public gatherings of any kind. To move an infected person or the remains of an infected person, in such a way as to expose the well, should be punished as a crime. To let an infected house, or to sell infected clothing and furniture, or to contribute in any way to the spread of communicable diseases, should be made a misdemeanor by law, to which a severe penalty should be attached.

It is not necessary to go further into details. This ground is covered to some extent by our Statutes and by the Common Law, but in the absence of suitable officers trained to sanitary work, nothing is done and the people suffer. A thousand lives are lost in this State every year which might be saved by the enforcement of suitable legal provisions to prevent the spread of contagious and infectious diseases. The money value of the lives thus lost is sufficient to pay five times over the cost of administering a State sanitary code.

In the same connection come up the important questions of pest houses and vaccination, but I must confine myself to an outline statement of the principles that underlie admissible sanitary legislation.

POLLUTION OF RIVERS.

An important chapter in a State sanitary code will contain provisions to prevent the contamination of flowing streams. Villages and cities deposit in rivers on which they stand every imaginable species of filth, entirely regardless of the health and comfort of communities located lower down on the same streams. There is a stringent Act of Parliament to prevent the pollution of rivers in Great Britain. Germany has followed tardily in the same path. Massachusetts alone among the American States has enacted a similar law. We cannot begin too soon in that direction. If such a statute had been passed in Wisconsin ten years ago, and enforced, it would have saved the City of Milwaukee at least half a million dollars, besides a world of discomfort and trouble. The Reports of the Rivers Pollution Commissioners of Great Britain on this subject

are a monument to the sanitary enlightenment of a great and practical people. Yet it is a curious fact that Parliament, in framing a law, entirely overlooked "the volume and ratio that effluent matters bear to the volume and ratio of the river" into which they are discharged.

MEDICAL PRACTICE.

An elaborate measure to protect the people of the State against pretenders to medical knowledge and surgical skill is not desired by a majority of the more thoughtful members of the profession. Neither is such a measure desired by the people. We now have an important statute that denies to the irregular practioners "the right to collect in any action in any court, fees or compensation for the performance of any medical or surgical service, or to testify in a professional capacity as a physician or surgeon in any case." Only one more provision is needed. No person should be permitted, under severe penalty, to assume the title of doctor, unless he shall have properly received such title by a "a diploma from some incorporated medical society or college." Section 2,565 of the Revised Statutes of Wisconsin provides that "Every court of record shall have power to punish, as for a criminal contempt,"

. . . "the practicing as an attorney in such court, without being first licensed as such, in the manner prescribed by law." It is not worth while to punish a person more severely for assuming to be an attorney than for assuming to be a doctor. If a citizen wishes to be physicked and have his broken bones set by a a quack, the State may act wisely in not interfering, but the assumption of the title doctor by a quack may deceive the citizen, may lead the citizen to employ the quack without knowing that he is such, and should therefore be prohibited. People in haste for a physician frequently stop at the first sign proclaiming that a Dr., or an M. D., has his office within. It is the duty of the governing agency to see that no false signs of that kind are hung out. The British Registration Law of 1858 is based on the sound principal that "it is expedient that persons requiring medical aid should be enabled to distinguish qualified from unqualified practitioners."

Compel the quack to announce to an afflicted world that *Mr.* So-and-so bleeds, pukes, purges, cuts of legs, sets bones, rubs, magnetizes, sweats, etc., and thus prohibit him from deceiving those who are in quest of a real doctor. If people *knowingly* prefer the quack, let them have him. The quack, like the regular practitioner, should also be held strictly accountable to the law of malpractice. When the quack is denied the right to enforce the collection of his fees, is prohibited from testifying as an expert, is forbidden to proclaim himself, by any device whatsoever, as a doctor, and is civilly and criminally held responsible for doing his work with the average knowledge and skill of the profession in his neighborhood, then let him take his crooked chance in the world. He may at least be of some use as a fool-killer.

Sanitary superintendents and their inspectors would be good agents to secure the execution of such a provision in a general law.

CORONERS.

In 1877 the Legislature of Massachusetts passed "An Act to abolish the office of Coroner and to provide for Medical Examinations and Inquests in cases of Death by Violence." In a remarkable paper by Dr. Chaillé, of New Orleans, read before the American Medical Association, at its meeting in Atlanta, last May (1879), the pith of the Massachusetts law is given as follows: "While coroners have been required, as they now are elsewhere, to discharge the incompatible duties of medical examiner and judge, that is, of an expert medical witness and of an expert judge of law, Massachusetts has now divorced this ill-assorted union of centuries; has created the 'Medical Examiner,' for the performance of one duty, and has transferred the other to the judges of the courts, and has specially enacted that 'whether homicide has been committed or not is a medical question, and whether that homicide be the result of accident, or be justifiable homicide, or manslaughter, or murder, is a legal question.'

"Thus, laws sanctified by centuries of hereditary prejudice and of barbarous precedent have, in Massachusetts, been at last beheaded by the slaughtering axe of common sense, which

emphatically claims that the coroner's medical duties should be assigned exclusively to a competent medical expert, and his legal duties as exclusively to a competent legal expert."

In the future sanitary code of the State the medical duties of the coroner will be assigned to the local sanitary superintendent, and his legal duties will be assigned to the courts where they belong.

SANITARY PROVISIONS.

Of course, one or more chapters in a general State law would be devoted to the details of such matters as find a place in our best municipal sanitary ordinances. The proper construction of sewers and the disposal of sewage, the drainage of houses, the regulation of privies and water-closets, the maintenance of public necessities and accommodations for factories, the abatement of all kinds of nuisances, the examination of unwholesome premises, the enforcement of cleanliness, the control of scavenger work, the removal from habitations of all organic refuse before putrefaction, the proper burial of the dead, the supervision of wells and other sources of water supply, the registration of tenement buildings, the restriction of offensive trades, the inspection and destruction of unsonnd meat and other food, the sanitary regulation of schools, prisons, alms-houses and other public institutions, and many such things which need not here be fully enumerated, should be subjects of sanitary legislation. Provisions should be made for putting the delinquent and the disobedient on trial and for the infliction and enforcement of penalties.

Judicial authority could not be and should not be conferred on sanitary officers. They should be especially empowered to make complaints and it should be made the duty of existing prosecuting officers to entertain such complaints and to proceed against offenders before the courts. Judges learned in the law and juries of the people would therefore stand between citizens and over-zealous sanitary officers. Such officers, however, should have the power of appeal from the lower courts, especially justices' courts, to a higher

tribunal. Otherwise a jury of blockheads in a justice's court, being "judges of both the law and the fact," might thwart the will of the legislature and, in many localities, block the wheels of a great and salutary reform.

DUTIES OF THE STATE SANITARY COMMISSIONER.

He should prepare, with the assistance of the Attorney General of the State, all blanks to be used by the sanitary superintendents and inspectors under his charge. He should supply such officers with the proper books in which they are to keep records of their work. He should inspect at least once a year all of the public institutions of the State, for the purpose of ascertaining their sanitary condition. He should cause the water supply of such institutions to be analyzed by the State chemist and microscopist in his office. Whenever there is a serious outbreak of disease in any part of the State, he should summon the sanitary superintendents of the locality to his aid and make a thorough investigation. In such case he should personally see that the provisions of the law are carried out for the public safety. All serious prosecutions under the law should be determined by him. In general, he should see that the work of State sanitation goes on in every district with energy, good judgment and efficiency.

The secretary, chemist and microscopist, should be able men, capable of giving the Commissioner counsel as well as aid. With their assistance the evidence should be prepared to support proper and necessary prosecutions in cases of adulteration, and in other cases going out of the working of the department. The four officers together should prepare circulars, to be distributed by the sanitary inspectors, giving information and warning to the people. They should select or prepare a text book of hygiene for use in schools. They should digest all the returns from district superintendents and make a careful report each year to the legislature of the State.

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The Commissioner should have the authority to engage special legal services in important prosecutions, when elective district

attorneys show themselves incapable, indifferent, hostile or cowardly. He and local superintendents should also have the power to issue orders to town, village, county and city officials, to abate nuisances, and perform other sanitary acts, in case the municipal corporations which they represent are guilty of either non-feasance or malfeasance in matters of public hygiene.

DUTIES OF THE SUPERINTENDENT OF A SANITARY DISTRICT.

To follow in part the instructions given to Medical Officers of Health by the English Local Government Board, it should be the duty of the superintendent of a sanitary district, to inform himself respecting all influences affecting injuriously the public health in his district; to inquire into the causes, origin and distribution of diseases in his district and to ascertain to what extent the same have depended on conditions capable of removal or mitigation; to keep himself informed of the conditions injurious to health in his district, by systematic inspection of the same; to give full information of the sanitary condition of his district to the State Commissioner; on the outbreak of any contagious, infectious or epidemic disease in his district to inquire into the causes and circumstances of such outbreak without delay, and to take measures in accordance with the provisions of the sanitary act to suppress it; to give immediate heed to information from a sanitary inspector that his intervention is required; to inquire into any offensive process of trade in his district and to take measures according to law for its prevention; to act as medical examiner in all cases of sudden death; to issue permits by himself or through his secretary for burials; to direct and superintend the sanitary inspectors of his district; to keep a full record of all the transactions of his office and to keep on file duplicates of all orders issued by him with returns of legal service endorsed on the same; to transmit all vital statistics of his district every month to the State office; to make a clear and condensed report once a year to the State Sanitary Commissioner; to procure evidence in cases of prosecution, and to perform such other duties as may be lawfully required of him by his superior.

The superintendent of a large sanitary district would need the services of an experienced secretary, and in the district comprising the City and County of Milwaukee he would also need the services of at least two trained physicians devoting their whole time to the work.

DUTIES OF A SANITARY INSPECTOR.

Again to follow in part the instructions of the British Local Government Board to an inspector of nuisances under the Public Health Act, it should be the duty of a sanitary inspector, to keep himself informed, by systematic and periodic inspection of his district, in regard to the nuisances that exist therein and require abatement; to verify any complaint made by a citizen of a nuisance by immediate inspection, and to report in writing to his superior concerning the same; to report to the superintendent any offensive trades within his inspection district, or any breach of the sanitary law; to visit and inspect from time to time, and forthwith on complaint, the places used for the sale of meat, poultry, fish, fruit, vegetables, bread or flour, and to seize such articles as are unfit for the food of man, that the same may be dealt with according to law; to procure, when so directed, samples of food or drink, and drugs, suspected of being adulterated, to be analyzed as provided by law; to give immediate notice to the sanitary superintendent of any case of contagious, infectious, or epidemic disease that may come under his notice or to which his attention may be directed; to keep a book, to be provided for him, in which he shall enter an account of all his acts; and to perform such other duties as his superiors may lawfully direct.

In a large district, instead of assigning a particular region to each inspector, it would be better to give to each a particular kind of work. For example, in the Milwaukee district, one might be a meat inspector, another an inspector of bread, pastry and confectionery, another a milk inspector, and so on, for the whole territory, instead of being an inspector of all these things for a limited territory. Experience would show what division of labor would make the sanitary force most effective.

In the district comprising the city and county of Milwaukee, provided the population is 150,000, the force would consist of the superintendant, a secretary, two physicians devoting their whole time to the service, and fifteen sanitary inspectors. A good deal is now done in the city with just about one quarter of such a force, but nothing in the county. The cost would be exactly \$15,000. The work under such an organized system would be very effective. It would be equally effective throughout the entire State.

III. INTERNATIONAL SANITARY CODE.

It is very evident that a great maritime nation like the United States, exposed by long lines of sea coast on both sides of the Continent to the introduction of contagious and infectious diseases, should be in legal sanitary relations with other countries of the world. A necessary complement to comprehensive State and Federal hygienic regulations for the protection of the health of people is an international sanitary code.

In 1851, France, in so many ways the leader of modern civilization, summoned a conference of European maritime nations, to consider the subject of international sanitary regulations. Thirteen governments sent consular and medical representatives to the conference, and a treaty was agreed upon, May 27, 1853. Sanitary science was not yet very well developed, and this treaty embraced only certain general principles. (1.) It was established that there should be efficiency and uniformity in the organization of sanitary authorities at the ports of the high contracting parties. (2.) It was further established that there should be necessary quarantine for vessels arriving at any port of entry. (3.) Certain regulations were agreed upon to be observed by vessels during their voyage. (4.) Regulations were also established to prevent the infection of vessels while loading at ports where contagious and infectious diseases prevail.

This early treaty is very instructive in its details and affords many important suggestions to the framers of an international sanitary code. A conference of manufacturing nations should

determine what adulterated goods shall be deemed contraband of commerce. The governments of all civilized countries should cooperate in preventing the spread of disease by the movement of infected persons and by the transportation of infected merchandise. The United States, England, France, Germany and Italy should give the same faith to the sanitary officials of each country that is now mutually given to their maritime tribunals. It is time that sanitation should be carried into the realm of law, not only in States and the nation, but between the enlightened peoples of the globe. Disease and untimely death, like pirates, are the common enemies of mankind.

CONCLUSION.

I have thus given in outline what seems to me to be the necessary basis of a general system of sanitation for the whole people. The hygienic code must conform to the genius of the institutions of a country and must be shaped to a great extent by the peculiarities of its government. Our double system of Federal and State laws necessitates a complex sanitary code. It is not easy in many things to determine just where state authority ends and national authority begins. There would inevitably be conflict of jurisdiction in hygienic matters, as there has been in many other things. But our laws have been administered without serious difficulty, and a national sanitary code and state sanitary codes could be adjusted in time so as to secure all desirable ends.

The government of England, beginning more than a quarter of a century ago, has enacted the undisputed conclusions of sanitary science into law. For this reason, the hygienic condition of England is superior to that of any other country. In this country there is very little administration of sanitary law, except in the leading cities. A few of us have faithfully administered municipal codes and have seen the good effects. The people of these cities have experienced the benefits and would not, if they could, go back to the almost fruitless days of mere sanitary teaching and preaching. They are not satisfied with talk about public health, but demand

that something should be perpetually done to protect it. No community can live by preaching alone. The morality, the sense of justice, that is born of public teaching, must be embodied in jurisprudence, must be translated into law to be enforced by the aggregate power of organized society. Whatever will not bear such a transformation at the hands of the legislator is wanting either in definiteness or in reality.

The reason for carrying the conclusions of sound sanitary science up into the crucial region of administered law is not far to seek. The author of the Health Primer, entitled "Premature Death," says in golden words: "In dealing with the personal care of health, it has become customary to treat of man as if he were an abstract personage, capable of procuring for himself, and doing for himself all that was necessary for the maintenance of his corporeal and mental well-being; he is taught the qualities of good and of bad air, of good and of bad water, of the requirements of wholesome houses, of the characteristics of healthful food, of the due regulation of exercise and habits. He is taught all these things, not as vague generalities, but as matters of precise knowledge which involve a high degree of moral responsibility in their application. All this is an essential part in the great process of health-education now going on, and is producing excellent and progressively increasing results. But this teaching has been, and is still, too much dissociated from the actual facts of the circumstances under which man lives in a civilized country. The vast majority of individuals are dependent for the sort of air they breathe, the water they drink, the homes they inhabit, the food they consume, the opportunities of relaxation they may have, and even of the habits they form, upon others, and they can bring to bear but an infinitesimal influence over these all-important elements of their physical welfare. How many of us can exercise the slightest control over the qualities of the water we drink, or of the air we breathe, the construction of the houses we inhabit, the quality of the food we have to eat, or our physical habits? We are, for the most part, the slaves of our purse and our occupation, and unable to help ourselves in these matters, *except as we act together as a community*. It is at this point where our ordinary

health-teaching mainly fails, namely, in *neglecting to show the circumstances under which individuals can only obtain sanitary essentials by conjoint action, as a community, and to what extent and in what matters the Legislature has made provision for such conjoint action.* The chief impediment to sanitary progress at this moment is the want of a just knowledge of the relations of the *community* to sanitary work, and the consequent misapprehensions of individuals and the insensitiveness of communities on this subject. What is now mainly wanted, in view of the furtherance of sanitary work, is an accuter sense among individuals generally of their common rights and common powers in sanitary matters."

The only way to bring to bear the power of the community, for the benefit of its individual members, is by the enactment and administration of law.

THE MILK SUPPLY OF MILWAUKEE.

"Now that milk has been so repeatedly and abundantly proved to be a source of epidemic disease, by reason of its imbibition of poisonous gases or contamination by polluted water, or at the hands of infected persons in dwelling-houses or rooms connected with dairies, it would be very satisfactory to know that stringent use was being made of recent enactments aiming at the separation of dairies from dwelling-houses, and the enforcement of precautions necessary for ensuring the safeguarding of this necessary of life on its way from the cow to the kitchen. This desideratum, however, appears to be still far from general realization. Mr. Corner gives, in his last report, two striking examples of what may occur for want of due sanitary inspection of dairies. In one case, the milk was stored and retailed in a yard where it was exposed to offensive gases; in another, the body of a child who had died from scarlet fever was found in the house of a dairyman, neither confined nor disinfected, and the mother had attended both on the child and on her customers during the several days of her child's illness. Under an adequate system of inspection, whether private or public, such dangers would be prevented."

—THE BRITISH MEDICAL JOURNAL, Sept. 6, 1879.



THE MILK SUPPLY OF MILWAUKEE.

During last winter I inspected in this city, and in the surrounding country, 227 milk stables. Very few stables, probably not more than half a dozen, escaped my attention. The number of cows inspected was 3041. It required between three and four hundred miles of travel to reach all the places where milk is produced for the Milwaukee market. "Dairies" kept for the manufacture of cheese were not inspected. My attention was strictly confined to cows, the milk from which is sold to the public within the limits of this city.

The time employed in the examination was twenty days. Full notes were taken on the premises inspected, embracing location, name of proprietor, number of cows, condition of stables, kind of feed given, general appearance of the surroundings, the amount of milk sent to market, etc. Each evening, while the work of the day was fresh in my mind, I wrote out from my notes a separate description of each "dairy" visited. There are 227 of these descriptions, carefully numbered and labelled, now on file in the office of the Health Department. An elaborate alphabetical and descriptive index to these reports, as they are called, has been prepared, which makes a volume of more than 250 pages. With the

(1.) A large portion of this chapter was sent to the Common Council in response to the following official resolution:

Resolved, By the Common Council, that the Commissioner of Health be and hereby is instructed to report without delay to this Council, a summary of any information he may possess in regard to the milk supply of the city of Milwaukee, and to make such suggestions as he may deem advisable for the remedying of any evils that may exist in regard to the same.

name of a milkman as a clue, I can immediately find for any citizen a full account of the place where, and the conditions under which, is produced the milk that he receives.

The average amount of milk daily sold in Milwaukee is 17,014 quarts. The average price paid for milk is not far from five cents per quart. The daily amount expended for the same is, therefore, \$850.70. Hence, the milk supply of Milwaukee costs \$310,505.50 a year. The statement is rather too low, for probably from one to two hundred cows escaped my inspection.

If the milk sold in the city should be vitiated in quality, by skimming, watering, etc., to the extent of only ten per cent. the total yearly loss to citizens would be over \$31,000. If any considerable portion of the milk thus sold should be rendered unwholesome by filthy stables, unhealthy cows, uncleanly surroundings, etc., none but Heaven could measure the sickness and suffering, or record the deaths thereby caused among children in the various households of the city. Against such considerations no fictitious "personal liberty" to be nasty, no spurious "freedom of trade" to supply the people with adulterated and polluted food, can stand a moment.

FEED.

An excellent feature of the milk business in this locality is that most of the cows are turned out to pasture in the summer. Only 107 cows in seventeen little "dairies" are kept shut up all summer. All the rest, 2,934 in number, feed on grass, to a greater or less extent, during five or six months of each year. Another commendable feature is that all but thirty-one are fed more or less hay during the winter. In many of the "dairies" the animals have all the hay they can eat, in its natural state. The proprietors of some of the stables cut the hay fine and mix it with other feed. Still another excellent feature is that 2,699 of the cows, out of the entire number of 3,041, in 195 stables, have more or less mill-feed. Course or fine "middlings," or bran, is fed to all the cows but 342.

In 186 stables, 2,092 cows are fed, more or less, on brewers' "grains." The "grains" are generally given in combination with

hay and "middlings." Some of the best "dairies" where the cows are vigorous and healthy, are fed in this manner. Distillery "slops" are fed in fifty-eight stables to 765 cows, or about one-fourth of the whole number.

Only 398 cows, in fourteen stables, get any corn meal. Corn stalks, steamed and cut fine, are fed in thirteen dairies to 331 cows. It is surprising, considering the large quantity of milk produced on farms contiguous to the city, that roots—turnips, carrots and beets—are used in only four "dairies" for fifty-six cows.

STABLES.

It is difficult to give an accurate statistical description of the buildings in which the cows are housed in winter, and, to a certain extent, during the night in summer. Sixty stables, containing 900 cows, are marked as well cleaned; fifty-nine, containing 637 cows, are fairly cleaned; fifty-two, containing 484 cows, are designated as absolutely filthy. The rest are filthy in various degrees.

Only forty-one stables, containing 893 animals, are described as well ventilated; 131, containing 1,396 cows, are entirely unventilated. When it is remembered that many of these stables are overcrowded, that they are also dark and filthy, the picture thus drawn to the imagination is not very attractive. Two hundred and three cows are fortunate enough to be housed in eight stables so dilapidated that good ventilation is furnished by necessity. The rest of the stables are ventilated to some extent in varying degrees.

Sixty-four stables, sheltering 1,080 cows, are light, or fairly light. On the other hand, 1,158 animals, in 113 stables, live in darkness day and night. The rest have some light.

Only fifteen stables, containing 189 cows, are described as being perfectly dry. On the other extreme, forty four, containing 544 animals, are designated as being decidedly damp or wet. These words mean, among other things, that the stables stand on undrained, wet ground. A large, intermediate number are not dry, but cannot be described as standing in mud or water.

Another question is closely allied with the previous one: 548 cows are kept in fifty-six stables, the atmosphere of which is loaded

with putrescent vapors. The liquid manure has run through the floors, saturating the earth beneath, undergoing putrefactive fermentation, and generating poisonous organic vapors. Only fourteen stables, containing 299 cows, are described as faultlessly sweet, or entirely free from the smell of organic decay. Thirty stables, sheltering 610 cows, are designated as "sour," as containing more or less organic vapor, although not positively stinking. It is hardly necessary to state that the odor meant is not the comparatively harmless odor of fresh animal excreta, but of excreta in a state of putrescent fermentation.

Two hundred and eighty-four animals are housed in thirty-one stables with swine. As most of these places are dark, damp, unventilated and putrescent, the entreatment of the poor creatures giving milk is positively cruel.

Of the 3,041 cows inspected, 1,192, in eighty-two stables, are well bedded, generally with straw. Of the rest, 1,170 have no bedding at all, but lie down in their own filth on the hard floor; and the intermediate number have some bedding, more or less, but generally less. The animals which have no bedding are usually subjected to other unwholesome conditions. A poor cow, living day and night in darkness, in a stinking atmosphere, without ventilation, badly fed, is really an object of pity.

SURROUNDINGS.

Under this head is noted the state of things outside of the stables. In ninety-four "dairies," aggregating 1,484 cows, the manure is frequently and well removed from the yards. In 112, aggregating 1,253 cows, the manure is either piled up outside of the stables or left long enough to become more or less offensive.

Under this designation are also noted the general outlook of the place, the cleanliness or uncleanness of the utensils used in carrying on the milk business, the proximity of nuisances, etc. Only fifty-two places, with 713 cows, are marked as unexceptionably good; eighty-seven places, with 1,151 cows, are designated as fair; seventy-eight, with 803 cows, are designated as not attractive; twenty-five, with 204 cows, are characterized as absolutely repulsive.

From the unexceptionably good to the absolutely repulsive there is a sliding scale of 165 dairies, embracing more than 2,000 cows, varying from almost good to almost repulsive.

As previously stated, nearly all the cows run to pasture in summer. Two thousand one hundred and forty-two kept in 162 stables, are never turned out in winter. They are confined to their stalls, day and night, without intermission, for at least one-half of the year. Only 899 in twenty-seven dairies are turned out on fair days, to breathe the fresh air and get a little wholesome exercise. In regard to a small number, it was impossible to ascertain the facts. Animals closely confined for six months, often in dark, crowded, unventilated and putrid stables, cannot be healthy, any more than human beings can be healthy under the same conditions.

These figures, obtained with much labor and care, might be grouped in other ways, so as to exhibit in a still more striking light defects already sufficiently apparent. My aim has been to present naked facts, without giving any coloring to the reality.

NECESSITY OF SUPERVISION.

It is obvious to any prudent disinterested citizen, to any reasonable man, that the business of supplying milk to the families of this city ought to be put under some restraint, to be subjected to vigilant supervision, to be regulated by just municipal enactment.

As Dr. George Wilson, a very high sanitary authority, truly says, "the greatest danger attaching to milk, as a carrier of disease, depends upon its remarkable powers of absorption and the rapid fermentive or zymotic changes it undergoes when it becomes mixed with putrefying matter, or tainted with disease-germs." The very essence of dung, saturating the atmosphere of stinking stables, the poisonous vapors of organic decay, the floating contagia of scarlet fever, diphtheria, small-pox and other infectious diseases, are all rapidly absorbed by milk, as a sponge takes up water, and may be conveyed to the mouths of innocent children or unsuspecting adults. When cows become unhealthy by being confined for several months in close, dark, unventilated stables, their milk undergoes vital changes, which chemistry cannot detect, which the microscope does not reveal, which the senses fail to discover, making it unwholesome.

No person should be allowed by public authority to sell to the people an article of diet so delicate as milk, of such universal use, except under conditions that shall reasonably guarantee its cleanliness and its freedom from every form of poison. Every milk-producer for this market should be required to turn his cows out to pasture during several months of the year; to underdrain his stables, so as to secure them against collections of putrifying liquid manure; to make the floors of his stables tight, so as not to saturate the earth beneath them with foul excreta; to clean his stables frequently and thoroughly, so as to keep the atmosphere within them reasonably sweet; to remove all the dung from his premises every day, so as to obviate as far as possible such a source of contamination; to give his cows plenty of space, light and air, so as to keep them healthy; to turn them out into open yard or field every fair day, so as to protect them from the unwholesome influence of long and close confinement; to keep his utensils clean; to use only pure water for his stock and for the cleansing of his cans, pails, etc.; and never to subject his cows to the company of hogs.

Maercker, a high German authority on the subject, gives 1,059, 1,412 and 1,765 cubic feet of air per hour as necessary for cattle of different sizes. Dr. Parkes, the highest English authority, says, "these amounts seem very small, but Maercker's reasons for not giving more seem to be on account of the lowering of the temperature." Each cow, in every milk stable, should have at least 1,000 cubic feet of air space.¹ Again says Dr. Parkes, "In cow-houses, disease and health are in the direct proportion of foul and pure air."

1. "The Metropolitan Board of Works," says *The British Medical Journal* of August 16, 1879, "in regulations for cow-sheds, fixed an 'air-space' of 800 cubic feet per cow, no height of the shed above sixteen feet to be reckoned. At a large meeting of the Dairymen's Association, held on Friday the 1st instant, a memorial was agreed to requesting the Board to reduce the requirement to 600 feet. This reduction is much to be deprecated; and it is to be hoped that the Board, when the matter comes before them, will stand firm to their regulations, which certainly are not over liberal in the allowance of air-space to the confined animals."

In the City of Brooklyn, the regulations require 1,000 cubic feet of air-space to each cow.

DANGERS OF DISEASE FROM MILK.

Fuchs, Hessling and Mosler, German scientists of high authority, have described microscopic fungi in milk, causing infantile diarrhoea and adding materially to the mortality of children, arising from the foul stables where cows are kept.

"There is now," says Dr. Wilson, "an overwhelming amount of evidence which proves, beyond dispute, that milk is largely instrumental in propagating scarletina and enteric fever." The English and German medical journals and health reports for the last six or eight years contain the distressing details of many such cases. There is respectable testimony to the assertion that when small-pox was prevalent in this city, three years ago, milk was allowed in several places to stand all night in the same room with persons laboring under that foul disease, before being sent to market the following morning. A gentleman of trustworthy character saw a dirty woman in his neighborhood soil her hands with excreta in the hasty care of a child afflicted with scarlet fever, then milk her cows without washing herself, and start on her way to the city, to distribute the product of her "dairy" to her heedless customers. It is the duty of the governing authority to make such provisions for the public safety as to render things like these impossible.

NEEDED REGULATIONS.

Prevention of evil is far less costly, and altogether more humane, than its punishment. After giving much thought to the subject, I have come to the conclusion that the best possible way to protect the public, and at the same time to encourage honest, pains-taking producers, while relegating the incorrigibly nasty and the wilfully indifferent to some safer occupation, is to require a license from every person who engages in the business of supplying milk to the people of the city. The conditions of cleanliness and safety, already pointed out, should be made the basis of a license. The cost of a license should be made light enough not to be oppressive. It should be proportioned, in each case, to the number of cows kept. The poor man, with only three or four cows, should not pay

as much license as the rich man who has sixty or seventy. Time enough should be given, before a license is demanded, to enable all to prepare for the conditions required. And the conditions should be such that they may be complied with by industry and pains-taking, rather than by outlay of money. In short, an enactment should be so framed as not to be unjust to any one, not to unreasonably burthen an important industry, while it affords the necessary protection to the people.

Such measures have been adopted in many European cities and have been found to work well. Some American cities have followed the example and are receiving great benefits from precautionary restrictions imposed upon the purveyors of a food so delicate, so sensitive to surrounding conditions, as milk. Dr. Wilson, after giving an account of many serious outbreaks of disease, especially of enteric fever, "due to polluted milk," wisely adds: "All this, it need hardly be said, affords the strongest possible argument that all dairies, or places where milk is sold, should be licensed and kept under especial sanitary provision."

An ordinance taxing the sale of milk for the purpose of municipal revenue would be unjust, impolitic, and probably unlawful. An ordinance regulating the sale of milk as a measure for the protection of public health, is clearly among the powers granted by the City Charter. It is quite as lawful, quite as necessary, to license the sale of milk as the sale of beer. The revenue from milk licenses should not exceed the necessary expenditure for an economic and effective administration of an enactment properly regulating the business. Under such restriction, the tax would be so small as not to afford a reasonable excuse to the producer for increasing the cost to the consumer.

Therefore, as a remedy for any evils that may exist in regard to the milk supply of the city of Milwaukee, I would respectfully suggest, for the consideration of the Council, the following:

ORDINANCE,

To prevent the sale of impure, adulterated or infected milk in the City of Milwaukee.

The Mayor and Common Council of the City of Milwaukee, do ordain as follows:

SECTION 1. For the purposes of this ordinance the term "milkman" shall mean any person who produces milk and sells it to others; the term "milk-dealer" shall mean any person who purchases milk and sells it to others; the term "milk agent" shall mean any person who sells milk on account of a "milkman" or a "milk-dealer."

SEC. 2. Every milkman or milk-dealer, who sells milk in the City of Milwaukee, shall procure a license therefor from the Mayor of said City on or before the first day of November of each year, which license shall be good for one year from the date thereof, unless the same shall be revoked for cause, as hereinafter provided.

SEC. 3. The Mayor shall grant such license only on the written recommendation of the Commissioner of Health and on the payment by the recipient of the license of a sum of money equal to fifty cents each for the whole number of cows from which the milk is to be sold under such license.

SEC. 4. The Commissioner of Health shall give such written recommendation only upon the following conditions: 1. All the cows from which the milk is to be sold under the license applied for shall be turned out to pasture not less than five months of each year, at least during the day time. 2. The ground on which any stable stands in which such cows are kept shall be thoroughly underdrained. 3. The floor of such stable shall be constructed of hydraulic cement, or sound, tightly-laid plank, so that no water nor liquid manure can penetrate through the same to the ground, and no swine shall be kept therein. 4. All liquid manure shall be conducted from such stable by an underground drain-pipe to a safe receptacle for the same. 5. Such stable shall be well ventilated and well lighted, and shall be large enough to give each cow kept therein not less than one thousand cubic feet of air-space. 6. Such stable shall be thoroughly cleaned often enough to keep the same free from any putrefactive smell, and all manure, both solid and liquid, shall be removed from the surrounding premises every day. 7. The cows from which the milk is to be sold under the license,

shall be turned out in the open air from two to six hours every day, except in severe storms, at all seasons of the year, and shall be supplied with an abundance of pure water. 8. And such applicant for license as aforesaid shall have the necessary conveniences, and give evidence of possessing the disposition, to comply with the requirements of section 4,607 of the Revised Statutes of the State of Wisconsin, which section is hereby made part of this ordinance.¹ The Commissioner of Health shall ascertain these prerequisites to giving a written recommendation for a license, by personal inspection, or from reports in writing, and placed on file, by a skilled inspector connected with his office.

SEC. 5. Each license granted shall contain the name in full and the postoffice address of the person to whom it is granted; shall state the number of cows from which milk is to be sold under such license, and where the same are kept; and shall be numbered. Corresponding entries shall be made upon a stub-book to be preserved in the office of the Mayor.

SEC. 6. The name and license number of each milkman or milk-dealer shall be painted conspicuously, in plain letters not less than three inches long, upon every wagon, cart, sleigh or other vehicle employed by him or his agent in distributing milk to customers, and upon any grocery or other business place where he or his agent sells milk or offers milk for sale. Any person neglecting or refusing to comply with the requirements of this section shall, on conviction thereof, pay a fine of not less than five nor more than twenty-five dollars for each offense.

1. The following is the statute referred to: "Any person who shall knowingly sell, supply or bring to be manufactured to any butter or cheese factory, or to any person to be used in the manufacture of butter or cheese, or to be used in any other manner, any milk drawn from a cow, not in a proper condition of health, or too near, either before or after the time of calving, or any milk which is adulterated by any deleterious, or contaminated by any filthy substance, or any milk which has been skimmed, or with the strippings left out of it, or that has been diluted with water, or colored by any substance, or which has become filthy by careless milking or handling, or tainted or partly sour for want of proper care in keeping pails, strainers, or any vessels in which said milk is kept clean and sweet, shall be punished by imprisonment in the county jail, not more than thirty days, or by fine not exceeding one hundred dollars."

SEC. 7. The Mayor shall revoke any license granted as aforesaid, whenever the Commissioner of Health shall make affidavit to him that the recipient of the same is not complying with the conditions upon which the same was granted, or has been convicted by the Municipal Court of having violated any section of this ordinance.

SEC. 8. Any person except an employe or agent of a licensed milkman or milk-dealer, selling milk in the city of Milwaukee without first having procured a license therefor according to the provisions of this ordinance, or whose license has been revoked, shall on conviction thereof, pay a fine of not less than twenty-five nor more than one hundred dollars for each offense.

SEC. 9. Any person who shall sell, offer for sale or cause to be sold, or give away or offer to give away, or bring, or cause to be brought into the city of Milwaukee any milk that has been drawn or handled by any one laboring under a contagious or infectious disease, or by any one whose clothing or person is infected with such disease; or milk which has stood in a room occupied by one laboring under such a disease, or in a room that has not been properly disinfected after being thus occupied; or milk which has been stored in cans, pails or other utensils that have been washed or otherwise handled by such diseased person, or have stood in the atmosphere of an infected room; or milk that has in any way been subject to the influence of human excreta or the putrifying excreta of animals; or milk from a sick or diseased cow, shall, upon conviction thereof, be subject to pay a fine of not less than fifty nor more than one hundred dollars, or to imprisonment in the House of Correction not less than thirty days nor more than six months, or both.

SEC. 10. Every employe or agent of any milkman or milk-dealer, engaged in the distribution or sale of milk, shall carry a card on which shall be clearly written the name and address of such employe or agent, also the name and license number of his employer or principal, and such employe or agent shall exhibit the

card aforesaid, on demand, to any policeman or officer of the Health Department. Any person violating this section shall be subject to a fine of not more than ten dollars.

SEC. 11. It shall be the duty of every police officer in said city to arrest the driver of any wagon, cart, sleigh or other vehicle used for the distribution of milk, on which shall not be painted the name and license number of the milkman or milk-dealer using the same, also any grocer or other trades-man selling milk, on whose place of business the name and license number of the milkman or milk-dealer for whom or on whose account he sells the same shall not be painted, as provided in section six of this ordinance, and the person thus arrested shall, upon conviction thereof, pay a fine of not less than one dollar nor more than five dollars, and unless the person thus arrested can show to the satisfaction of the court that he is the *bona fide* employe or agent of a licensed milkman or milk-dealer he shall be subject to the penalty imposed by this ordinance for selling milk without a license.

SEC. 12. Every milkman or milk-dealer, or the employe or agent of such milkman or milk-dealer, shall sell to any officer or employe of the Health Department one quart of milk, on tender therefor of the customary price, for analysis, and every refusal thus to sell shall be punishable by a fine of not more than ten dollars.

SEC. 13. It shall be the duty of the Commissioner of Health to appoint, subject to the confirmation of the Common Council, a milk inspector and a skilled analytical chemist to aid him in carrying out the provisions of this ordinance, the aggregate compensation of whom shall not exceed the amount paid for milk licenses.

SEC. 14. All ordinances and parts of ordinances not consistent with the provisions of this ordinance are hereby repealed.

SEC. 15. This ordinance shall take effect on and after the first day of November, eighteen hundred and seventy-nine.

THE ORDINANCE NOT OPPRESSIVE.

Administered with moderation and justice, with helpful instruction to the well-disposed, and with needed firmness in exceptional cases of obstinate indifference to the rights of the

public, such a measure would be effective. It would unquestionably save considerable sickness, prevent some deaths, and preserve happiness in households where sorrow might otherwise come.

The tax imposed upon the milk trade by such a measure would be insignificant. It would amount to only twelve or fifteen hundred dollars a year. The tax imposed by this trade upon the citizens by "impoverishment" of milk, has doubtless amounted to many thousands per annum.

The changes contemplated by the measure would not be expensive to milkmen. Many of them are already, in their own interest, fulfilling all the conditions demanded by the public safety. Labor, rather than outlay of money, is required to make all the places where milk is produced perfectly wholesome.

If license is made a prerequisite to selling milk at all in the City, if the granting of license depends upon sanitary conditions already fulfilled, and if the continuance of license depends upon the permanent maintenance of sanitary conditions, then the regulation of the milk supply by the Health Department of the municipal government will be possible. As John Smion says, speaking of milk as a means of conveying filth diseases, "the general public are in intimate sanitary partnership with various of their purveyors of food." And so far as the legality and justice of imposing restraints upon such purveyors is concerned, an eminent judge has said from the bench, in language that cannot be too often repeated: "The public health, the welfare and safety of the community, are matters of paramount importance, to which all the pursuits, occupations and employment of individuals, inconsistent with their preservation, must yield."

The ordinance was introduced into the Common Council on the 9th of June, 1879, and referred to the Committees on Health and Judiciary. It met with violent opposition from many milkmen, at the very outset. Indignation meetings were called and resolutions, strangely misrepresenting the measure, were passed.¹ In

1. A considerable number of the milkmen, however, petitioned for the passage of the ordinance.

response to the action of one of these meetings, I sent to a leading city journal the following

COMMUNICATION.

OFFICE OF THE COMMISSIONER OF HEALTH, }
MILWAUKEE, July 4, 1879. }

I don't know how I can better celebrate the Fourth of July than by defending the cause of twenty-five thousand babies in the City of Milwaukee against one or two ward politicians who engineered the meeting of milkmen at the North Side Turner Hall, last evening. "The ordinance would oppress the poor," said such a politician, "and enable the rich to monopolize the market." There is nothing in the ordinance that warrants any such statement. I take, almost at random, three or four "reports," from the huge bundle in my possession, as illustrations.

Here is the case of a very humble milkman: "He has two cows, which are fed on hay and 'grains.' They are not turned out in winter, but run to pasture in summer. The stable is clean and sweet, but not lighted. The cows are bedded. The surroundings are fair." This poor man, under the ordinance, would have to let some light into his stable, and turn his cows into the yard on fair days to take the air. His license would be \$1, while the license of the rich man, with eighty cows, would be \$40. Take another case: "He has nine cows which are fed on hay, meal and 'middlings.' They are turned out several hours in a large yard, every fair day in winter, and run to pasture in summer. The stable is light, ventilated, roomy, clean and free from smell. The manure is well removed. The surroundings are good." Here is a poor man whom the ordinance would not touch at all. In general, the small milkmen have cleaner places than the big ones, and would consequently be less affected by the ordinance than the big ones.

Take the case of a "dairy" with nearly thirty cows: "The stable is dark, unventilated and very foul. The air is reeking with steam and the odor of putrescent ordure. The cows are not let out at all. No bedding is used. The floor of the stable is slippery with urine and semi-liquid manure. The cows have a bloated, unhealthy

look. I was warned not to remain in the stables long, lest my clothing should become saturated with the sickening smell. A man was milking by the light of a lantern in the day time, holding the pail between his legs, because the floor was too nasty to set it down. The animals have lost the peaceful, ruminating look natural to cows even in ordinary health. The milk absorbs, while being drawn, the gases of the stable, which are of the very essence of animal excreta." Of course, the ordinance would interfere with this man's business.

A petition was drawn up at the meeting, which sets forth that "the passage of such an ordinance would entail great hardship and suffering on the undersigned," etc. This again is not true. The following is the report in my office of the "dairy" of one of the "undersigned." "He has thirty-six cows, which are fed on hay, 'grains' and 'middlings.' The cows are turned out in fair weather and run to pasture in summer. The stables are large, light, dry, ventilated, clean and sweet. The manure is well removed to land. The cows are well bedded and in excellent condition." The ordinance would not touch him at all, for its provisions only aim at the maintenance of cleanliness. He and many more good, honest, law-abiding men were deceived by a few black sheep in their own line of business, and by one or two statesmen seeking cheap political capital, or they would not have been there.

I have no desire to hurt anyone. One hundred and twenty-five thousand people in this city, who pay more than \$300,000 a year for milk, certainly have some interest in this matter, as well as the dealers. A great army of "little ones" plead through the sworn guardian of the public health for milk from healthy cows in clean stables. With ignorance and prejudice I shall be patient, but I shall not be very tolerant with the "cussedness" that regards the loss of a hundred votes as a much greater calamity than the death of a hundred babies.

Ninety per cent. of the milkmen can comply with the requirements of the ordinance without any particular trouble. It will "entail great hardship and suffering" on none. A few would have to put their stables in order and clean up, or quit the business. To

such I commend the example of an energetic German who has nearly forty cows. His record was one of the worst. Instead of spending his time and breath in fighting what he knew as well as anybody was a needed measure of sanitary reform, he set himself to work to transform his place from one of the filthiest and most unwholesome to one of the neatest and healthiest. If the ordinance passes, it will not touch him when it takes effect, for he will be ready for it. Besides, his change of procedure will add a good deal more to the value of his "dairy" than the cost of cleaning up.

The more you stir this matter, gentlemen, the more people you send to my office to see your record. Nothing will please me better than to be able truthfully to change a bad record into a good one.

O. W. WIGHT, M. D.,

Commissioner of Health.

FATE OF THE ORDINANCE.

This will be clearly enough indicated by the following communication to the legislative department of the municipal government:

OFFICE OF THE COMMISSIONER OF HEALTH, }
MILWAUKEE, Aug. 4, 1879. }

To the Honorable, the Common Council:

There is no doubt that the Legislature of the State has the power to authorize the Common Council of this city to pass an ordinance subjecting to license the sale of any article of food or drink within the corporate limits. Whether the City Charter confers such authority or not is a question of fact to be determined by examination of its provisions. Section 16, Chapter XIII, of the Charter, authorizes the Council "to pass such ordinances . . . as may tend to promote and secure the general health of the inhabitants of said city." It would seem that an ordinance to subject the sale of milk—an article of food daily used by all the inhabitants of the city—to sanitary supervision and reasonable conditions is clearly within the provision aforesaid. Again, Clause 9, Section 3, Chapter IV, expressly empowers the Common Council "to regulate and restrain the sale" of all kinds of provisions in the

city. To "regulate" is defined by our best lexicographer to be "to subject to a prescribed course." To "restrain" is defined to be "to keep from action by any means." The power thus granted "to regulate and restrain" the sale of milk, in my judgement, implies the power to license its sale, or in other words to permit its sale only under such reasonable restrictions as the Council may impose. Several of the best lawyers in the State, whom I have consulted, agree with me in this opinion.

The Chairman of your Judiciary Committee and the City Attorney, both of them learned in the law and especially conversant with the Charter, are, however, of the contrary opinion. Inasmuch as it would be impracticable for my department to execute a measure opposed to the legal convictions of the City Attorney, it seems to me unwise to press the passage of the ordinance "to prevent the sale of impure, adulterated and infected milk in the City of Milwaukee," proposed by me, and I respectfully recommend the Council to indefinitely postpone its further consideration.

Failure of the measure is to be regreted, for it was designed to prevent an evil rather than to punish it; to really benefit the milkmen, by giving them helpful sanitary instruction, while protecting the public. Laws enough exist for inflicting penalties on delinquents, which may hereafter be more strictly enforced. A considerable number of misguided milkmen have invited such a result, and will have themselves to blame if necessity arises for executing the statutes of the State as well as the ordinances of the City. Respectfully submitted,

O. W. WIGHT, M. D.,
Commissioner of Health.

According to the official legal authorities of the city, it is lawful to tax the poor man's unfailing friend, his dog, two dollars, but unlawful to tax the dairy-keeper's cow, from which the poor man gets milk for his children, even fifty cents, for the purpose of ensuring a clean and healthy supply.

As the matter is of overwhelming importance to all citizens, I shall, in conclusion, call witnesses to show what is the actual state

of knowledge in regard to the spread of infectious diseases through the agency of milk. Nothing shall be left undone on my part to warn the people under my sanitary charge. If they remain apathetic, the fault will then be their own. From one of the most reliable sources in England (*The British Medical Journal*, Nov, 8, 1879,) I take the following:

DIPHTHERIA AND MILK.

"The inquiry undertaken by the Committee of the Pathological Society in the early part of the year into the alleged connection between certain diseases of the cow and diphtheria in the human subject, does not seem to have as yet made much progress; and, indeed, it is doubtful whether any real addition to our present most imperfect knowledge on the subject will be effected within any reasonable time, unless Government takes up the question. There is a precedent for this course in the inquiry made by Dr. Throne in 1869 into the effects produced in the human subject by consumption of milk from cows having foot-and-mouth disease; and it certainly seems desirable that the matter should authoritatively be set at rest without delay. It appears to us that some of the money annually granted by Parliament for auxiliary scientific investigations could be devoted to no better purpose than to ascertaining the precise conditions under which this article of universal diet becomes, when its purveyors neglect to take proper precautions, a fertile source and propagator of disease. Such an inquiry would, indeed, be only a part of a very large and promising investigation in the extensive field of comparative pathology, such as was shadowed forth by Mr. Simon so long ago as 1868. Commenting on the admirable report by Dr. Burdon Sanderson on the Communicability of Tubercle, contained in his tenth volume of *Reports to the Privy Council*, Mr. Simon observed that those investigations 'suggested a speculation with regard to human tubercle, which may, indeed, extend to many human diseases which are called specific and zymotic; whether, perhaps, our pathological terms 'common' and 'specific' may not, more than has yet been supposed, be found variable with the particular animal spoken of as affected, rather

than attaching fixedly to the given diseases; whether, namely, the 'common inflammatory' affections of some animals may not be the 'specific' affections of others; whether, for instance, some common 'traumatic' affection of this brute or that may not correspond in essential chemistry to this or that 'specific' zymosis of man, and even in some cases be the source whence the latter was first derived.' It is not a little curious that these words of pregnant meaning should have lain fallow for so considerable a period without any steps being taken to test the accuracy of their conclusions; but nothing more seems to have been thought of the subject until the publication of Mr. Power's report on the diphtheria epidemic of North London drew the attention of the profession forcibly to it.

"We are impelled to these observations by a study of some reports by Mr. E. L. Jacob on the circumstances of the prevalence of diphtheria at Weybridge, Addlestone, Leatherhead, and Sutton, in different parts of his combined district. On a particular day, ten persons in eight houses in the village of Weybridge were attacked with diphtheritic sore-throat, and fresh cases occurred daily in these and in other houses for nine days, after which the epidemic suddenly ceased. During that time, about sixty persons (nearly half of whom were adults), living in thirty houses, came under medical treatment for the disease. One of the earliest sufferers was a young man (a milk-carrier), who, with one other person, died from the disease. Those infected were found to be living in all parts of the village, and principally in houses of the better class, most of which had a separate water-supply and system of drainage. The only discoverable circumstance which they had in common was that they all had their milk from one dairy in the village. This dairy supplied about one hundred and fifty households, of which thirty (or twenty per cent.) were attacked; while the remaining three hundred and fifty families in the parish, which were supplied with milk from three or four other sources, entirely escaped the disease. This very unequal incidence of the throat-affection upon two groups of consumers pointed very strongly to the milk as the cause of the epidemic. Moreover, amongst the customers of this dairy there were eleven families at that time which had stipulated

for a supply of milk every day from the same cow. To meet their requirements, the milk of two or three particular cows was set aside and distributed separately, under the name of nursery milk; the surplus, if any, of such milk being added each day to the bulk of the supply. Out of these eleven families, nine (or nearly eighty-two per cent.) were attacked with sore-throats; while of the remaining one hundred and thirty-nine families who drank the rest of the milk from this dairy, twenty-one (or only fifteen per cent.) were attacked. There was, therefore, a special incidence of the affection upon the consumers of the nursery milk—a circumstance favouring the idea that this portion of the milk had especially, if not solely, acquired infective properties, and that the admixture of it with the general mass of the milk explained the illness of those who did not stipulate for nursery milk. Amongst those who suffered from the throat-illness, were the dairyman, his female servant, the wife of his cowman, and one of the milk-carriers, the illness of all but the last named (who died from its effects) being extremely slight. Careful inquiry failed to elicit that any case of sore-throat had occurred amongst those employed at the dairy, or in any of their families prior to the day on which the disease appeared suddenly in eight houses. Neither could it be shown that the houses to which the milk had been distributed by this particular carrier had especially suffered. The water in use at the dairy was derived from a well on the premises, and was found to be much contaminated with sewage matters. There was no evidence that the specific poison of diphtheria could have got into the well before the outbreak, and no suspicion that any of the impure water had been added to the milk. In the yard at the back of the premises, where the milk-cans were cleansed and left to drain, was an untrapped inlet to the house-drain; and in the floor of the dairy was a gully leading to an unventilated drain. A week after the epidemic began, the cows were all examined by a veterinary surgeon, and pronounced to be in excellent health; none of them had been recently purchased, and no change had been made in their food. Adjoining the meadow, however, where they fed, is a lake which receives some of the sewage of the village. The result, then, of

the inquiry was to show clearly that the epidemic was due to milk-pollution or milk-infection; but, though there was much ground for suspicion, there was not sufficient evidence to warrant any conclusion as to how the milk became polluted or infected. It must be remarked, however, that it is, of course, quite impossible to say with certainty that no impure water had been surreptitiously added to the milk. Moreover, as the dairy seems to have been under no scientific supervision, it is possible that some of the cows may have suffered from an undetected or unreported affection of the udder, from which they had recovered before the somewhat tardy visit of the veterinary surgeon.

"The cause of the epidemic at Princess Mary's Village Homes, Addlestone, which affected in all forty-eight persons (forty-two of whom were between the ages of four and fifteen), is much less clear, but there are certain circumstances which lead to a strong suspicion of milk as the cause of the mischief. The water-supply of the farm which supplied the Homes (but no other house in Addlestone) with milk was found to be impure; one of the cows which supplied the milk had lately been suffering from garget; and the epidemic began rapidly to decline about eight days after the milk-supply had been discontinued, no other measures being simultaneously adopted which would account for its sudden subsidence at that time. Against the milk-theory was the circumstance that the infants, who were the greatest consumers of the milk, almost entirely escaped; but the force of this objection is diminished by the consideration that their milk was always scalded before use, and that children under three years of age are known to be not very susceptible to the poison of diphtheria.

"About the same time as the outbreak at Weybridge, there was a considerable prevalence of diphtheria at Leatherhead, though the epidemic was not so sudden either in its commencement or in its cessation. Fresh attacks were reported for about six weeks, and altogether, from first to last, about fifty-five cases in thirty-six houses were reported, with five deaths. Two houses had four cases in each, four houses had three cases each, five houses had two cases each, and twenty-five houses had only one case in each. Eighteen

of the patients were adults, of whom two died; and thirty-seven were children, of whom three died. The infected houses were situated in all parts of the village, on every variety of soil, and were chiefly of the better class. In the matter of soil, water-supply, drainage, school congregation, or personal infection, they had nothing, or very little, in common; but they almost all had their milk from the same dairy-farm. Of about 530 houses in the parish, 280 are supplied with milk from one farm, and of these, twenty-nine out of the thirty families invaded during the chief stress of the epidemic were using milk from this farm. This very unequal incidence of the disease upon the two groups of consumers (coupled with the fact that the milk-supply was the only discoverable circumstance that the sufferers had in common), pointed very strong to milk as the cause of the outbreak. As to how the milk became polluted or infected, however, nothing definite could be found. None of those employed in the cowsheds or dairy had had any throat-illness before or during the epidemic; all the cows were, and had long been, in good health; whilst the water in use at the dairy was derived from a soft water tank, and had at times smelt offensively, and the pipe from the sink at which the milk-cans were cleansed was not properly trapped and disconnected.

"The outbreak at Sutton was not so extensive as some of the others, but it appears to lead to the same conclusion. Within two days, fifteen persons, living in eleven houses in different parts of the town, ten of them of considerable size, and nearly all having good sanitary arrangements, were attacked with diphtheria. All of them were supplied with milk from one dairy, but nothing could be learnt at the dairy which threw more light on the question. Its water-supply was good; the cows were healthy, and had had no change of food lately; no cows had been recently added to the stock, and no extra milk purchased from other dairies. The dairyman, his servants, and their families were, and had long been, all well.

"Evidently in all these cases there was a noxious influence at work which has not been isolated. It is of the most crucial importance, if people are not to be poisoned wholesale by diphtheritic milk, that it should be isolated; and here, then, is a subject

for investigation which it should be the earnest desire of our Government Medical Department to track out and thoroughly exhaust. Every epidemic of diphtheria in which infected milk can conceivably be the cause, should at once be inquired into on behalf of the Local Government Board; and in this way we might hope, not only to find a clue to the particular mystery which is now baffling us, but also some useful knowledge as to the general circumstances of the origin and spread of this still obscure disease."

Again, from the same high and authoritative source, I take the following:

TYPHOID EPIDEMICS FROM INFECTED MILK.

"An increasing number of epidemics of typhoid fever due to infected milk are reported year by year. This is not, of course, because milk is more polluted than formerly, but because medical officers of health are now able to trace outbreaks, for which in days before milk-infection was thought of they would be unable to account, to the specific pollution, by some means or other, of the milk supplied by particular dairies. Three epidemics of this kind have recently been brought under our notice. Neither is reported so minutely as it might be, but the evidence implicative of the milk seems in each case to be unassailable. About the third week of August, 1878, a sudden but limited epidemic of typhoid fever occurred at Croydon. The incidence of the disease, according to a certain milk-supply, was so marked as to lead to the conclusion that the fever-poison was distributed by that article. Of forty-eight cases of which Dr. Philpot obtained information, thirty-seven lived in houses supplied with milk from one source. About the same time, there was a considerable prevalence of typhoid fever at Portsmouth, which attracted the attention of the medical officer of health, and which was for some time, until experimentally disproved, supposed to have arisen from the leakage of a water-main. After much pains, the epidemic was traced down to a farm where there was a child lying ill of typhoid, and where the well was within a few feet of the privy cesspit. The supply from the dairy was distributed to a number of milkmen, besides about twenty persons; and,

amongst these last, there were eight cases of typhoid. Numerous cases could also be traced back to the dairy; and its use at the mess at Eastney barracks was followed by an outbreak of typhoid there. When the source of the mischief was discovered, the farmer was forbidden to sell any more milk, and the milk in stock was purchased of the retailers and disposed of down the nearest drains. Out of a total of 153 cases of typhoid occurring during July, August and September, in the borough (where the disease is always more or less prevalent), sixty-four per cent. were shown to have obtained their milk directly or indirectly from the suspected source. A very recent case of the same kind was reported by Mr. Davies to the Bristol Town Council at their meeting last week. Hearing of several cases of typhoid fever in the northern part of the city, all clearly traceable to polluted milk from a mixed retail supply, Mr. Davies immediately visited the retailer, who told him whence his principal supplies were derived. Acting on this information, Mr. Davies visited a farmhouse three miles from Bristol, where he found the only hard water on the premises to be drawn from a pump in the dairy in a farmyard containing manure in all stages of decomposition. This water stank abominably when pumped, and is described by Mr. Davies as "simply poisonous." It was stated that this water was never used for washing the milk-utensils, but that soft water was used. However this may be, Mr. Davies is convinced that the evil lies in the well; and certainly the place seems, from its surroundings, to be totally unfit for a dairy. In reporting on this epidemic, Mr. Davies says:

I consider that no dairy for the supply of towns should be licensed as such unless proved to be well supplied with hard water, and also free from a supply of impure water, on the premises. Without such a requirement for all milk-supply dairies, the section on dairies in the Contagious Diseases (Animals) Act will prove a delusion and a snare for the public.

"Of course, in this recommendation of Mr. Davies we heartily concur; and we may say further, that it is now well known, from the example of a well known company in London, that all the rigid precautions necessary to secure absolute safety in respect to the water-drainage and condition of the milk may be imposed

without interfering with the ordinary course of business. It is much to be regretted, therefore, that means are not taken, such as this experience has proved to be possible, to ensure the safety of the milk-supply of cities. A further precaution—to which Mr. Davies does not refer—is, however, essentially necessary; and that is, that the premises in which the milk is received from the farms shall be so constructed as that no dwelling house or living rooms communicate with the place in which the milk is stored, and that no drains open into them through which polluted sewer-gas can enter. There exists a well known model in London on which the necessary precautions may be based; and it is much to be regretted that the by-laws of the Metropolitan Board of Works in London and of other authorities elsewhere do not provide adequately for the cutting off of the places in which milk is stored and sold, from living rooms and dwelling houses of which the inmates are at any time liable to become the subjects of infectious disease; nor of any precautions taken that the places in which the milk is stored are suitable for the purpose of receiving a fluid so highly absorbent of miasm."

CUMULATIVE EVIDENCE.

Finally, to sum up this whole serious business, I give the testimony of Dr. George Wilson, (*Handbook of Hygiene and Sanitary Science*, p. 53), one of the best informed and sober-minded writers on the subject in Great Britain. "As regards the spread of specific disease," he says, "there is now an overwhelming amount of evidence which proves, beyond dispute, that milk is largely instrumental in propagating scarlatina and enteric fever; and amongst other instances may be mentioned the following:—The late Professor Bell, of St. Andrews, has related an outbreak of scarlet fever in that town, which showed very conclusively that the fever was distributed by the milk-carrier, or, what is more probable, that the diseased cuticle from the woman and children who vended the milk actually passed into it, and that in this way the poison was introduced.—(*Lancet*, 1870). Again, Dr. Taylor, of Penrith, gives an account of a somewhat similar outbreak, in the *British Medical Journal*, 1870, where he also reports a group of cases of enteric

fever which he believed to be due to specifically infected milk. Further, Dr. Ballard (*Lancet*, 1870) records an outbreak of enteric fever in Islington, which he attributed to the washing of the milk-cans with water derived from a tank which was found to communicate with two old drains, and one of these with the pipe of a water-closet. Whether the milk was adulterated with the same water was not ascertained, but the evidence, both positive and negative, rendered it tolerably certain that the disease was propagated in this way. These outbreaks were the first of the kind which were thoroughly investigated, but since then several others have been reported; as, for example, the outbreaks at Armley, a village near Leeds, investigated by Dr. Robinson and Dr. Ballard in 1872; an outbreak at East Molesay, near Birmingham, also investigated by Dr. Ballard in 1873; an outbreak at Parkhead, a suburb of Glasgow, investigated by Dr. Russell in 1873; and the well-known outbreak at Marylebone, London, the real cause of which was, in the first instance, suspected by Dr. Murchison and others, and was subsequently investigated in all its intricate bearings by Mr. Netten Radcliffe, assisted by Mr. Power. In this instance, the disease appeared within a few weeks in as many as 123 families, of whom 106 obtained their milk from a new milk company, and Mr. Radcliffe proved with 'a probability amounting for practical purposes to a certainty, that—

'(1.) The outbreak of enteric fever, which formed the subject of enquiry, was caused by milk infected with enteric fever material;

'(2.) That this came from a particular farm;

'(3.) That the water used for dairy purposes on this farm contained excremental matters from a patient suffering from enteric fever, immediately before and at the time of the outbreak.'—(See Mr. Simon's *Reports*, New Series, No. II.)

"Lastly, there is the recent remarkable outbreak at Eagley, near Bolton. Early in the present year, over 200 persons were attacked in and around Eagley with undoubted enteric fever, and within the space of a few weeks. It was found that those attacked, both in Eagley and in Little Bolton, derived their milk from a dairy

farm belonging to a Mrs. Kershaw, that the milk itself had been 'impoverished,' and that there was the strongest evidence to show that it had been diluted with water impregnated with fæcal matter. Whether or not this matter contained the specific virus of enteric fever has not yet been made quite clear, although it has been ascertained that one of the men, whose excreta passed into the brook from which the water was derived, had been suffering from diarrhœa.—(*Sanitary Record*, 1876.)

"Other serious outbreaks might be quoted, but these are sufficient to prove that milk is a far more frequent agent in the spread of disease than is generally suspected; and, for my own part, I am inclined to believe that many obscure cases of enteric fever, and much of the autumnal diarrhœa, which occur in rural districts, are due to polluted milk."

The evidence seems to me conclusive, and I hope the Legislature will amend the Charter of Milwaukee by the addition of two words, so that the Common Council will thereafter have no excuse if it fails to put the milk supply of the city under the full supervision of the Health Department, and to subject the dealers to the necessary restraints of a proper license.

PREMATURE DEATH IN MILWAUKEE.

"Recent observations have shown that there is not much difference, except in degree, between tuberculosis and pyæmia; and that all the class of so-called strumous or scrofulous maladies, including consumption, are as capable of prevention as is ordinary blood-poisoning. The inquiry must be made, therefore, why phthisis appears so often in our death-lists, as well as scarlatina or typhoid fever. Nearly all the diseases which are fatal to young people are amenable to prophylactic measures, and capable of diminution in their fatal effects. If these deaths can be diminished—and of this there can be no reasonable doubt—it is probable that they may be altogether prevented by a right application of knowledge; and then pneumonia, bronchitis, mesenteric disease and other causes of death among young people, will cease to be common among us as well as those deaths which are produced by enthetic disease. Many of those evils which affect bony tissue, and which now give occupation to the surgeon, will then become diseases of the past. Those ailments which disfigure the human form will then be found more often in fiction than in fact among civilized people. It is a glorious field, and opens out to our view magnificent prospects. The death of the child will be the exception and not the common end of more than half of the human beings which are brought into the world. It is a serious thought that the majority of the population are deprived of their natural birthright, viz., 'health and life,' by the ignorance of sanitary law which now prevails."—DR. ALFRED CARPENTER IN HIS ADDRESS DELIVERED TO THE SANITARY INSTITUTE OF GREAT BRITAIN, AT CROYDON, OCTOBER 22, 1879.

PREMATURE DEATH IN MILWAUKEE.

Of the one hundred and twenty-five thousand people who form the population of Milwaukee, two thousand or thereabout die, on the average, every year.

Of these deaths *one-tenth* only are of persons who have reached the full term of life, namely, seventy-five years and upwards; *nine-tenths* are *premature*, that is to say, are deaths of persons whose lives have been cut short before the expiration of their natural term.

About *one-fourth* of the 2,000 persons who every year die prematurely, die in infancy; somewhat over *four-tenths*, including those who die in infancy, die by the time the fifth year of life is completed; the deaths of the remaining *six-tenths* nearly are distributed pretty equally over the period of life between childhood and old age.

Premature death, as here considered, comprehends all deaths except deaths from old age. The distinction is not a mere verbal redundancy. It marks a point of view from which the contemplation of death is best approached for the purposes of health preservation whether in its public or its private aspects. A just sense of the gravity and scope of the questions involved in the advancement of the health, whether of a community, or of a household, or of an individual, is in the main dependent upon the accuracy of our conceptions as to the *prematureness* of the vastly greater number of the deaths which occur among a population.

The foundation of *preventive medicine*—or, as it is termed in its more familiarly known aspect, *sanitary science*—rests on our knowledge of the causes of this excessive amount of premature death, of the conditions under which these causes operate, and of the extent to which they are avoidable.

THE CAUSES OF PREMATURE DEATH.

The foremost places among these is held by *diseases of the lungs*, including *phthisis*—the *consumption* of popular language. More than *one-fourth* of the whole number of premature deaths are caused by this class of diseases.

Next in order of predominance are the *infectious diseases*—the eruptive, contagious, or infectious fevers, small-pox, scarlet fever, measles, enteric (typhoid) fever, &c. These cause nearly a *sixth* of the premature deaths.

Then, occupying the third place among the causes of death, come the *diseases of the brain and nervous system*, including *hydrocephalus*. These give rise to about an *eighth* of the premature deaths.

The fourth place is taken by certain diseases classified along with the infectious diseases as *general* maladies, the whole system being affected by them as a direct result of their development and progress, and not as a secondary consequence of the local disturbance of particular organs. The diseases referred to, here for convenience considered apart, include rheumatism, gout, syphilis, cancer, scrofula in certain forms, &c., and cause a *tenth* of the premature deaths.

Fifth in order of magnitude are the *developmental diseases*, so called (exclusive of old age), namely premature birth, teething, childbed, atrophy and debility, &c.

Sixth are the *diseases of the heart and blood-vessels*, including dropsy.

Seventh, the diseases of the *stomach, intestines and associated organs*.

Eighth, the results of *violence*, including suicide.

Ninth, the diseases of the kidney and urinary organs.

Finally follow in succession *diseases of the joints* and *diseases of the skin*.

Such is a general statement of the causes of premature death given in the order of their relative importance.

It must now be understood that the mortality from the several diseases and classes of disease falls with very different force at various periods of life. There is a wide difference between the incidence of the several causes of death in infancy, in childhood, in youth, in mature age, and in the decline of life.

In *infancy* diseases of the brain and nervous system, notably, *convulsions*, rank first among the causes of death, *diseases of the lungs* have the second place, and *diarrhæal diseases* the third.

From the end of the first year of life to the end of the fifth—that is to say in *early childhood*—the *infectious diseases*, especially scarlet fever and diphtheria, give rise to the greatest mortality; then, as in infancy, next in order of mortality, at this period of life, come *lung diseases*, and third, the *diarrhæal diseases*.

In *childhood and early youth* (five to fifteen years) the *infectious diseases* are the chief causes of mortality, principally scarlet fever, continued fevers, and diphtheria.

From *youth to manhood* (fifteen to twenty-five years) *phthisis* is the most important cause of death, and the infectious diseases sink to the second place.

In *early manhood* (twenty-five to thirty-five years) *phthisis* still maintains the first rank among the causes of death, but a marked increase in mortality is now observed from other diseases of the lungs. The infectious diseases continue to hold the second rank among the causes of death at this period of life.

In *manhood and maturity* (thirty-five to fifty-five years) *phthisis* maintains its predominance among the causes of death, but now the mortality from other diseases of the lungs becomes largely

augmented. The second place in the order of causes of death at this period of life is taken by diseases of local origin, especially local affections of the brain and nervous system, of the heart and blood-vessels, and of the digestive organs; *cancer* now becomes an important source of mortality; but the infectious diseases sink to a comparatively low place among the causes of death.

In the *decline of life* (fifty-five to seventy-five years), the *diseases of local origin*, including diseases of the lungs, are the chief causes of death, phthisis, the infectious diseases and general diseases, as a rule, except cancer, becoming relatively less predominant. At this period of life, indeed, the causes of death foreshadow the more general decay of old age (seventy-five and upwards), where death, if it does not arise from the natural inability of the several organs, in the progress of decay, to continue their functions, unaffected by exterior circumstances, is mainly brought about by local accidents of the brain and nervous system, the heart and blood-vessels, irredeemably damaged in the course of the decay.

The progress of fatal disease through the several periods of life has, in fact, characteristic relations with the natural condition of the body at the different periods. The fatal diseases of infancy are significant of the immaturity and mobility of the infants' organs and functions. The fatal diseases of childhood relate, not so much to states of the system then in fullest vigour of vital reaction (to inherent conditions of the body, so to speak), and to the influence of the media in which we live, as to the accidental liability of exposure to morbid agencies current among populations, such as the contagions of the catching diseases, as, for example, scarlet-fever, small-pox, measles, diphtheria, &c. With the completion of manhood, diseases indicative of local degenerations of tissue begin to be predominant, and with each successive stage of life this predominance becomes more marked. In old age the degenerative changes, which at earlier periods of life are regarded as the signs of disease, now appear as the natural consequences of decay, and death becomes a physiological, not a pathological fact—as the

termination of a natural life, not as the premature close of a life cut short by disease.

THE CONDITIONS UNDER WHICH THE CAUSES OF PREMATURE DEATH
OPERATE.

It may be well, before entering upon an examination of the conditions of prevalence of the several classes of disease which have been set forth as causes of premature death, to interpose a caution as to localities in which the rate of premature mortality is least. It has become customary to speak of these localities as *healthy*. The phrase is eminently misleading and, indeed mischievous. The term *healthy* as applied to these localities is in reality used relatively with regard to the greater mortality of other localities. It will scarcely be maintained that people live too long in these so-called *healthy* localities, or that people die in them from unavoidable causes alone. The sources of their smaller mortality are generally sufficiently obvious, but they do not as a rule include the removal of such causes of premature death as man himself creates, and, indeed, are quite independent of any intelligent cooperation on his part. Conditions of unwholesomeness are relatively as rife among rural communities as in towns, and to describe the state of these communities with reference to their mortality as *healthy* is to state not only what is inaccurate but to justify the inaction of their sanitary authorities. What work of theirs, they ask, could make a healthy locality more healthy? These localities of small mortality are the *least unhealthy* as compared with localities of great mortality—the large towns, for example. But as a rule they are positively *unhealthy* as regards their capacity for wholesomeness. It is necessary to have in mind, then, that the term *healthy locality*, as things go at present, should read *least unhealthy locality*.

Taking now the causes of premature death in the order of their predominance, *diseases of the lungs*, including *phthisis*, first come under consideration.

The common condition determining diseases of the lungs is the sudden alterations of temperature to which persons are liable from

exposure to weather. There are numerous artificially created conditions which predispose to the operation of the common determining condition—the sudden alternations of temperature—and it is upon the extent to which these artificial conditions exist that the greater or less prevalence of fatal lung-disease depends. We observe these in their simplest state in our ordinary household arrangements, where, in our eagerness to protect ourselves from cold or variable weather, we commonly box ourselves up in atmospheres more or less fouled by domestic operations, by our own breathing and by the insensible emanations from the body, by artificial lights particularly, and by all the various sources of impurity which needs the continuous and never-ceasing exercise of the housewife's care, if any reasonable state of cleanliness of air and surroundings is to be obtained and maintained. The lungs supplied with an impoverished and vitiated air gradually lose that aptitude of resistance to those alterations of temperature which occur in the ordinary progress of weather and season, and the time comes when a sudden change, aforesaid unheeded and harmless, checks the natural action of the breathing apparatus, and brings about the states known as inflammation of the air-tubes, *bronchitis*, or of the substance of the lung, *pneumonia*, or leads to change of the lung-tissue, perhaps unrecognized at first, but which may become one of the formidable diseases of youth and adult life, *consumption*. It must be obvious how, under the circumstances of nursery life as commonly carried out, the infant and young child are peculiarly exposed to harm, even in the best houses and among the well-to-do classes, from the artificially created atmosphere in which they too generally live. And when we contemplate the conditions of life under which infants and young children exist among the poorest and least provident classes, where they are housed in atmospheres fetid with every odious product of human filth, and where in inclement weather warmth is mainly obtained from the huddling together of the living, we can understand how the delicate and sensitive breathing apparatus of infancy and childhood readily breaks down under the incessant irrigation of the filthy air which is breathed.

What may thus be observed in too many cases in our ordinary household life is observed also substantially in all the indoor occupations of youth and manhood. Each of these occupations has to be followed under artificial conditions of atmosphere all favourable to, and some directly active in, the production of lung-diseases.

Phthisis is especially the lung-disease of youth and early manhood; other lung-diseases predominate in infancy and early childhood, and in the latter half of life. This predominance of phthisis during the more actively occupied working ages is itself significant of the influence of industrial occupations upon its prevalence, and its occurrence is notably allied to sedentary labours pursued in ill-ventilated rooms, amidst fouled atmospheres. But it has been recently ascertained that there is a widely operating condition which exercises a most important influence in predisposing persons to the degenerative changes in the lungs which we call phthisis. This condition is *dampness of soil*. Eminent authorities in England and America have shown, each independently of the other, that *dampness of soil is an important cause of phthisis to the population living upon it*. It is difficult to exaggerate the practical value of this conclusion in relation to sanitary work and administration.

Infectious Diseases, such as scarlet fever, the continued fevers, measles, diphtheria, small-pox, etc., hold the second place in order of magnitude among the causes of premature death. It is necessary for a clear apprehension of this part of our subject, to deal separately with each of the more important diseases which enter into the class of infectious diseases. But before doing this, it will be well to explain in what sense the word infectious is used here, and also to note an important distinction which separates the several sorts of diseases into two classes.

Much confusion has arisen, and still arises, in the use of the terms *contagion* and *infection*. There was a time when each word was used in a particular sense, and the transmission of a disease by contact (*contagion*), and of a disease by pollution of the air with

the transmitting material (infection) were believed to represent cardinal differences in the propagation of the transmissible diseases. It is now known that the distinction originally implied in terms does not exist, that there is no such thing as mere *contact* transmission of the diseases in question, and that the phenomenon of transmission is by no means confined to diffusion of the transmissible material in the air. Hence both the words *contagion* and *infection* are now used technically and generally as convertible terms, typifying, as applied to disease, the property of its transmissibility in some way or other from the sick to the healthy. It would have been well if both words could have been discarded, for a tradition of their former use still attaches to them, but they would seem to have become permanently fixed in the language. The tradition of old use adheres, however, more firmly to the word *contagion* than to the word *infection*; and even at the present day we find persons bewildering themselves and confusing others by using the former word in a sense which has long ago ceased to be in force, and which, in fact, is meaningless in the present state of medical science. We have here adopted the word *infection* and its derivatives in preference to the word *contagion* and its derivatives, as the former is less apt to trip up the reader by the false lights of old associations than the latter.

There is a general question relating to *infection* which may, perhaps, be as well referred to here as elsewhere. Persons exist who believe that the *infection* of the various infectious diseases operates quite independently of the conditions which govern the development and prevalence of most other diseases. Given the *infection*, the phenomenon of its spread follows, according to these persons, as a matter of course. Now, all the *infections* are influenced in their spread and prevalence, although in different degrees, by certain well-understood conditions, some peculiar to the individual, some peculiar to his surroundings, some peculiar to the locality in which he is placed, some peculiar to seasons of the year; and it should be clearly understood that our ability to limit the prevalence of *infection* is dependent upon our knowledge of these conditions, and of our capability to remove them.

The infectious diseases admit of being divided into two classes with reference to the circumstances under which they exist. This division involves a distinction that has an important practical bearing, as will be seen in the sequel.

Several of these diseases, as for example small-pox, scarlet fever and measles, have originated in remote ages under conditions of life of which we can form no conception in the present day. We know nothing of the causation of these diseases, except as coming to us by successive transmission from period to period, from country to country, from nation to nation, from person to person. They are never absent from among us, at one time existing only in a few scattered centres, at another spreading over the whole people as an *epidemic*. The infectious diseases, indeed, are especially designated epidemic diseases from this notable phenomenon of general prevalence at intervals. *Epidemic* is a word which in its proper signification is descriptive, and simply means general prevalence in a community, or a district, or a country. Certain mysterious technical meanings have been attached to the word which are nothing more than concealments of an ignorance which even the learned need not be ashamed to admit. The word *epidemic* when used of disease, or of any other phenomenon to which it is applicable, should be used simply in its ordinary and proper sense, as defined by Webster, to-wit: "Common to, or affecting, a whole people, or a great number in a community; prevalent; general."

Others of the infectious diseases, as the continued fevers, diphtheria, influenza and malignant cholera, probably have their origin in conditions which recur at intervals, or which habitually exist among us, or which are produced in certain social convulsions. Thus influenza would appear to depend for its origin, as well as for its prevalence, upon as yet undetermined meteorological conditions; diphtheria is so closely allied with sundry sources of domestic insalubrity which apparently affect houses in the country more markedly than in the town, that it would appear to have its origin in a particular combination of these as yet unknown; enteric fever seems to be born out of the excremental filth amongst which large sections of our population live; typhus and relapsing fever are the

products of overcrowding, privation and absolute famine, as different degrees of this trinity of foulness, want and suffering obtain; while malignant cholera, known to us only as a terrible importation at intervals from the East, is believed to be a product of excremental filth, acted upon by a tropical sun, under the conditions mainly found among the low-lying lands in the delta of the Ganges.

The infectious diseases which have had origin at a remote period, under conditions which have probably disappeared, and the infectious diseases which may originate under conditions existing at the present time, present themselves in their practical aspect in different lights, as we shall see presently.

Scarlet-fever is the most fatal to life of the infectious diseases common to this country. The distribution of the mortality caused by it over the country is marked by great irregularity. There are localities in which for a period of years no deaths occur from scarlet-fever, and from which it is known that the disease has been wholly absent. On the other hand there are localities where the disease, always being present, deaths from it form one of the most regular features of the mortality returns.

These localities constitute the *scarlet-fever fields* of the country. There the disease is continuously cultivated, and from thence it presumably spreads at intervals, sweeping over the entire country. In the greater number of these places it is known that there are great agglomerations of populations of young children, but these agglomerations are not peculiar to these localities alone. The special conditions which determine the fatal prevalence of scarlet fever in the localities named have not yet been made, strange to say, a subject of detailed investigation, although such investigation gives the greatest promise of our being able to provide for the arrest of a starting epidemic of scarlet fever at the source.

The *Continued Fevers—typhus, relapsing fever, enteric fever*—stand next in order of fatality to scarlet-fever among the infectious diseases.

Typhus is pre-eminently the fever of overcrowding and destitution—of an overcrowding and destitution which happily are

things almost unknown in this country. Wherever overcrowding and destitution are pushed to the extreme, and where these conditions concur with, or follow close upon, great fatigue, there typhus almost invariably makes its appearance. We have thus seen it developed among the Turkish forces and some portions of the Russian forces in the war recently ended, and the disease spread broad-cast in the districts and among the soldiers at the seats of war in Eastern Europe and Armenia. This event was looked for as inevitable when the Turkish commissariat arrangements failed, and when the half-starved men, exhausted with fatigue, clad miserably in rags, were compelled to seek warmth by close-packing in their tents and in the houses of the peasantry, under indescribable conditions of filth. The conditions which gave rise to the disease were the conditions which favoured most its spread by infection. Once developed, the disease spared none coming within its infective influence; and the civil populations of the districts occupied by the opposing armies, and to which the sick, the wounded, and prisoners were sent, contributed to a mortality which, in the end, proved larger than the mortality caused by sickness and wounds among the troops during the campaign.

There are states of destitution which would seem to give rise to the infection of typhus, the infecting persons themselves not suffering from the disease. In 1868, when famine prevailed in Algeria, the starving Arabs flocked into the towns in the utmost state of misery and privation. It was observed that many of these miserables, as they craved relief or lay about in corners, or beneath such cover as afforded some sort of shelter, exhaled a penetrative putrefactive odour in their breath and from their bodies—in other words, that, still living, they were apparently putrefying. No symptoms of fever or other acute disease were observed, but the persons who came in contact with them were rapidly struck down with typhus, which, thus lighted up, spread on all sides.

Typhus, as ordinarily observed, is peculiarly a disease of towns. It is doubtful whether a case of real typhus has ever been seen in this city.

Relapsing fever appears in much the same conditions as give rise to typhus, but it has more marked relations with famine, and hence is popularly known as *famine fever*. It has never visited Milwaukee.

Enteric fever is a special product of putrefying human excrement, under conditions not yet fully known. Originating in excrement, the excremental matters of the sick who suffer from it possess the power of producing the disease in others, not less definitely than the breath and emanations from a case of small-pox or of scarlet fever or of measles, will produce small-pox or scarlet fever or measles, as the case may be. Enteric fever is so universally distributed in the country, and the mode of production by the infective discharges of the sick from the disease has become so much the more common mode, that it is difficult in any given case to exclude the probability of infection. Be this as it may, the occurrence of enteric fever means that the sufferer has taken into his system, by breathing or swallowing, a sufficiency of putrefying excrement, or of excrement to which special infective qualities have been given by having passed through the bowels of a person affected with enteric fever, or of the special morbid products of the two sorts of excrement. He has swallowed or breathed, as the case may be, the actual stuff or its products, as presented to him in the form of an emanation coming from the filthy open privy pits which still disgrace a large portion of the town, or as a cloud of dust wafted into public places where the stuff has been promiscuously scattered on the surface of the earth, or as it has been conveyed to him suspended in the air which has intruded upon his privacy or permeated his residence from an improperly arranged cess-pool or ill-ordered drain, or as he has drunk it unsuspectingly in water or as distributed in milk. Enteric fever, indeed, is becoming the household and municipal fever of this country. Its prevalence and persistence is the surest indication of the failure of householders and local authorities in having secured, the former their families, the latter the communities under their charge, from the mischievous action of the most repulsive filth.

Malignant Cholera.—This formidable infective disease appears among us only at intervals. It takes its origin in India, principally in the low-lying lands of the Lower Provinces of Bengal, especially within the delta of the Ganges. There the disease does not appear to be ever absent, and occasionally it breaks out with great intensity, manifesting at the same time an extraordinary diffusiveness. While usually this diffusiveness is limited to India, and the conditions on which it commonly depends do not exist beyond the coast line or the northern boundry of that country, when the exceptional diffusiveness referred to declares itself, the malady is no longer restricted in its development and power of propagation within the limits of the Indian peninsula. At such times, wherever persons sick of the disease carry it, there it exhibits similar phenomena to those observed in its Indian home, takes temporary root, and grows in any locality favourable for its reproduction into which it may be imported. Each place where it is thus planted becomes a new centre of propagation, and so by successive infections of localities it may traverse the whole world.

Now the local conditions which favour the development of cholera are similar to those which favour the development of enteric fever; and there is good reason for the belief that the infective quality of cholera, as of enteric fever, rests in the intestinal discharges of the patient. The conditions under which cholera spreads are thus stated in the official memorandum issued in England by the Local Government Board, for the information of sanitary authorities—a memorandum prepared for that Board by its former Medical Officer, the great master in sanitary science and craft, John Simon:—"It is characteristic of cholera, not only of the disease in its developed and alarming form, but equally of the slightest diarrhoea which the epidemic influence can cause, that all matters which the patient discharges from his stomach and bowels are infective, and that, if they be left without disinfection after they are discharged, their infectiveness during some days gradually grows stronger and stronger. Probably, under ordinary circumstances, the patient has no power of infecting other persons except by means of these discharges, nor any power of infecting even by them, except

in so far as particles of them are enabled to taint the food, water or air which people consume. Thus, when a case of cholera is imported into any place, the disease is not likely to spread, unless in proportion as it finds locally open to it certain facilities for spreading by *indirect infection*. In order rightly to appreciate what these facilities must be, the following considerations have to be borne in mind:—*first*, that any choleraic discharge cast without previous thorough disinfection into any cess-pool or drain, or other depository or conduit of filth, infects the excremental matters with which it there mingles, and probably to some extent, the effluvia which those matters evolve; *secondly*, that the infective power of choleraic discharges attaches to whatever bedding, clothing, towels and like things have been imbued with them, and renders these things, if not thoroughly disinfected, as capable of spreading the disease in places to which they are sent (for washing or other purposes) as, in like circumstances, the cholera patient himself would be; *thirdly*, that if, by leakage or soakage from cesspools or drains, or through reckless casting out of slops and wash water, any taint (however small) of the infective material gets access to wells or other sources of drinking water, it imparts to enormous volumes of water the power of propagating the disease. When due regard is had to these possibilities of indirect infection, there will be no difficulty in understanding that even a single case of cholera, perhaps of the slightest degree, and perhaps quite unsuspected in a neighbourhood, may *if local circumstances co-operate*, exert a terribly infective power on considerable masses of population."

Whooping-cough (as also *influenza*) has still to be numbered among the diseases of which the conditions of prevalence, otherwise than as they are spread by infection, are unknown.

We know nothing of the history of *measles* except as a transmitted infection from the sick to the well. Of all the permanent infections measles is the most difficult to deal with preventively, as the disease becomes infectious during the three or four days' indisposition which precedes the eruption, and when, very commonly the child still associates with its companions, and its indisposition is not heeded. Measles varies very greatly in its intensity in different

epidemics; sometimes prevailing as a most malignant malady, sometimes, and more frequently, as one of the slightest of specific ailments.

The history of *diphtheria* goes back to remote times. Unlike that of small-pox and scarlet fever, the history is not one of continuous propagation by infection. Difficult as it is to deny all chances of infection in a country where the malady is naturalised, yet the most careful observers appear to have come to the conclusion that the disease not unfrequently springs up anew among us. The conditions under which these apparently new growths are observed have been, in towns, markedly connected with exposure of the subjects of the disease to the air of imperfectly ventilated sewers and drains; and in the rural districts, in addition, to the filthy surroundings of ill-kept farmsteads. The disease has a certain preference for country districts as compared with town districts; and dampness of houses or of soil seems to play some part in its localisation.

Of all the infectious diseases *small-pox* is perhaps the least affected in prevalence by individual and external conditions, setting aside the artificial condition of vaccination. There are exceptional persons who, irrespective of vaccination, resist the infectiousness of small-pox; and the disease itself is apparently influenced in its activity by season. It is true that the time of its greatest activity in this country, the colder months of the year, is the time when persons, keeping more to their houses, the chances of dissemination among families are augmented; but in India, where the influence of meteorological changes admit of being more clearly discriminated in respect to the disease, there seems to be no doubt that the potency of the small-pox infection, as that of vaccine virus, is diminished during the hot season. It is reasonable to infer, then, that some part of the fluctuation of small-pox in this country depends directly, and not indirectly, upon seasonal influence. There are reasons for the belief also that the local conditions of population may affect the degree of infectiveness of small-pox. There has been none in this city since July, 1878.

The great epidemic of 1871-72 was unexampled in the memory of living man for the diffusiveness of the disease and its malignancy. Now the starting-point of this epidemic, it is averred by a very thoughtful and competent observer, Leon Colin, was in a part of Brittany. There, shortly before the siege of Paris, small-pox appeared among a population unprotected by vaccination. The disease declared itself with a malignancy only observed in the first instance among populations so placed, and under ordinary circumstances it would probably have exhausted itself in the district where it assumed this character (so slight was the communication between it and the surrounding country), or at the worst would have extended in a scattered and manageable form into the districts immediately adjacent. But the exigencies of the Franco-German war brought about a state of things which, according to our authority, converted what would otherwise have been an exceptionally severe local outbreak of small-pox, which would have served alone to point a local vaccination-moral, into a world-wide dissemination of a malignancy so great as to compel the serious attention of Governments. First, it was necessary to draft into the French army, to the utmost limit, conscripts and recruits from the infected district; secondly, it was found impossible to carry out in time of war those precautions as to vaccination and re-vaccination of persons added to the army which are insisted upon in time of peace. So it happened that the conscripts and recruits from the infected locality in Brittany carried with them into the army the malignant disease prevalent in their homes. The army at the time furnished an abundance of unvaccinated and imperfectly vaccinated individuals for the reception and propagation of the disease in an unmodified state. As the army moved hither and thither it spread the disease among the civil population, and prisoners and wounded taken by the Germans carried the malady among the German forces and into Germany. Paris early received the infection from detachments of troops, having the disease among them, who marched into the city before the siege; and there, shut in, the malady multiplied under circumstances peculiarly favourable for retaining its malignancy. With the raising of the siege and the resumption of

communication between Paris and the outer world, the first outrush of the released inhabitants and foreigners who had had to remain within the city during the investment, scattered the malady broadcast in hitherto unaffected provinces, to adjacent countries which to that time had remained unaffected.

The origin assigned to this small-pox epidemic suggests a line of observation and practice respecting other infectious diseases of considerable moment. It is not impossible that the occasionally observed malignancy of other infectious diseases, especially scarlet fever, measles and diphtheria, may in the first instance be the result of local conditions especially favouring such a development of the malady. It is now known that the virulence of an infective product of disease may be cultivated to an extraordinary pitch in the laboratory. A phenomenon that can be artificially produced may also, it is to be presumed, be naturally produced, and the excessive virulence sometimes observed in the action of the small-pox, the scarlet fever, the measles and the diphtheria infections may at times undergo a course of undesigned cultivation under peculiar local and individual circumstances similar to that which has been observed of other sorts of virulent morbid products in the laboratory. This is a possibility which it is now necessary to keep well in mind, in view of the phenomena of malignancy showing themselves in connection with any of the ordinary infectious diseases; because, even pending the determination of the scientific question, such malignancy should influence the precautionary measures adopted to prevent the spread of the disease, by giving to them the greatest stringency of which they are practicable.

Popular observation has long anticipated what will presently become probably an important scientific truth, namely, that a severe form of infectious disease, in transmission, begets a severe form. Medical science has hitherto dwelt upon the reverse of this belief, namely, that a mild form of infectious disease in one person may beget the severest form in another; but it has not fully pursued the relations of the more malignant disease as to degree of virulence in successive transmissions. Now it is not uncommon to hear mothers who look to the occurrence of scarlet fever and measles among their

young children as an ordinary and unavoidable incident of child-life which it is desirable to get over as early as practicable, express the wish, when a mild type of scarlet fever or measles is prevalent, that their children would, on account of this mildness, "catch" the disease then.

Diseases of the brain and nervous system including *hydrocephalus*, hold the third place in rank among the causes of premature death. This position is almost wholly due to the preponderance of "convulsions" as a cause of death in infancy among the diseases of this class. These diseases fall to their lowest point as causes of death in adult life, to increase again as life advances and old age steals on.

The fatal diseases of the nervous system which occur in the decline of and in advanced life may be taken in the main to be the results of degenerative changes going on in the nervous tissues, which are, in fact, for the most part, the changes of natural and often premature decay. On the other hand, the fatal diseases of the nervous system in infancy and early childhood are, in a large proportion of cases, the indications of an immaturity or defective vitality or original vice of organization related to the class of developmental diseases so called, which we shall have next to refer to. At the best, the mobile and impressible nervous system of the infant responds to exterior influences and impressions in a manner very different from that commonly observed later in life. Morbid conditions, which, in late childhood, in youth, and in manhood, are manifested by shiverings, appear in the infant to be manifested by convulsions. But the question that most concerns us here is that the prevalences of diseases manifested by brain symptoms in infancy and early childhood, especially the prevalence of convulsions, is obviously influenced by certain local insanitary conditions.

The most striking instance of the influence of local insanitary conditions upon excessive local prevalences of these diseases is obtained from what is known of the effects of a vitiated state of the atmosphere in promoting convulsions. About the beginning of the century very many of the children born in the Dublin lying-in hospital died of what were termed "nine-day fits," in other words,

fatal convulsions, which ordinarily set in about the ninth day after birth. The master of the hospital, at that time Dr. Clarke, came to the conclusion that much of this excessive mortality from convulsions among the infants depended upon the foul state of the atmosphere, which existed in the then very imperfectly ventilated wards. Acting upon this opinion, measures were adopted for improving the ventilation, a marked diminution in the numbers of fatal cases of "nine-day fits" following. These measures were still further developed, the rate of mortality from the nine day fits diminishing with each successive improvement. In the end the mortality among the new-born children was reduced to a *sixty-eighth* part of what it had been when the first measures for a more effective ventilation of the wards had been adopted.

General diseases, so called, other than the infectious as commonly known, have the fourth place in order of predominance among the causes of premature death, and among these diseases the foremost position is held by *cancer*, the *wasting of infants* (mesenteric wasting), *croup*, *scrofula*, and *rheumatism*.

Cancer. This formidable malady is of the rarest until after the twenty-fifth year of age. Between the twenty-fifth and thirty-fifth year of age the mortality from it begins to increase; after the thirty-fifth year the augmentation is considerable; and the maximum is attained between the fifty-fifth and sixty-fifth year. The disease, in fact, is markedly a disease of adult life. As yet there is, unhappily, no clue to the causes of this dreadful malady, but recent advances in medical knowledge of the mode of development of the disease gives reasonable hope that, at some probably not far distant period, we shall obtain an insight as to the conditions which determine it. Cancer has a tendency to run in families; but the assumption that the inherited cancerous state affects the whole body does not therefore follow. Recent researches tend to show that cancer is primarily a local affection, and that the general state of indisposition which marks its progress is the result of a gradual infection of the system, through the blood, with the cancerous products of the local disease. It is difficult to believe that, if this view of cancer prove

to be accurate, it will not lead to important consequences both in the medical, the surgical, and the preventive treatment of the malady.

The *mesenteric wasting of infants*, and *scrofula*, belong to the same category of disease production in which phthisis and hydrocephalus are included. The same morbid cause, acting in different organs, produces the various results which have received the several names given, namely, in the lungs, phthisis; in the brain and its membranes, hydrocephalus; in certain of the abdominal glands, mesenteric wasting; and in the general glandular system, scrofula. The medical doctrine of the conditions under which these diseases are developed is becoming more hopeful in view of prevention, as in the case of cancer. In these tubercular diseases also it is now beginning to be understood that the starting-point, as in cancer, is a local affection, and that the general affection of the system, or the manifestation of other local centres of disease, is the result of a gradual infection through the blood with the tuberculous products of the centre first formed. Medicine is beginning to see its way to clearer conceptions of the conditions liable to determine the commencing local mischief, and these conceptions indicate possible future ways of controlling phthisis, and presumably the congenerous diseases.

Rheumatism has not only an important place among the premature causes of death, but it is one of the most important causes of disablement. It is especially a disease arising from cold and damp, whether as experienced in sudden alterations, or in continuous exposure. In the rural districts the disease is probably less a question of exposure to the weather than of housing. The foster-beds of rheumatism here—as also in town districts where like conditions of housing obtain—are the too numerous cottages, and even houses of a better class, which have been built without any provision to protect them from the damp of the soil, without sufficient means of lighting and ventilation, and of which even the walls are apt to retain moisture like a sponge. Such houses—damp and chilly, often not weather-proof, incapable of being properly warmed by the biggest fire or the hottest sun, and from which the

outer air is as much as possible excluded in order to keep in the buildings such warmth as may be given to them—are the foster-beds of rheumatism. And when, as too commonly happens, they are occupied by families whose means are straitened, rheumatism becomes one of the most important agencies in producing degeneration of race.

The *developmental diseases* (exclusive of old age), namely, atrophy and debility, premature birth, teething, childbirth, &c., have the fifth place in the order of causes of premature death. These diseases derive their generic name of *developmental* from their being chiefly incident to particular periods of the growth of the frame. Thus *teething* includes the death of infants and young children which happen during the development of the first set of teeth—the milk-teeth—and for which no other cause appears to be assignable than the disturbance of the system, which at times accompanies this development. *Atrophy* and *debility* include, for the most part, deaths of infants who from birth, owing to defective conditions of the digestive organs, appear to be incapable of appropriating the nourishment given to them, and waste away, or who appear to die from imperfect vitality, or who are the victims of bad management. *Premature birth* includes the death of children who have been born at a time when they were so undeveloped as to be incapable of sustaining life after birth. *Childbirth* includes the deaths incident to the parturient state.

But in so far as the developmental diseases affect infancy, they are in great part indications of degenerative changes of race. They are chiefly observed under conditions in which communities have been exposed, generation after generation, to states of occupation and of living which have brought about marked degradation of type in the individuals composing it.

Degenerations of race are by no means confined to the industrial classes. Each order of life presents some form or other of them, but among the orders who live under conditions of well-being these degenerations are observed mainly as the result of pernicious habits, such as the excessive use of intoxicating liquors (not peculiar to these orders, but among them the evil influence of

such excess as a degenerative agency may be more clearly distinguished and closely observed), and of certain maladies, such as the tubercular (consumption being an example), and the cancerous, of which the tendency to may be transmitted in families.

One of the most formidable consequences of these degenerations of race is observed in the great proportion of immature children born among the people subject to them, and of children actually diseased at the time of birth. The terms "premature birth," "teething," "atrophy and debility," among the developmental diseases; "convulsions" and "hydrocephalus," among diseases of the brain and nervous system; and the "wasting of infants" and "scrofula" among the general diseases, largely cover conditions of the system, tubercular or other, which are expressions of a state of degeneration. And when this degeneration has not been such as to destroy life in infancy, its results are observed in after-life, influencing or determining the incidence of numerous forms of disabling or fatal disease, while the degeneration may be propagated from parents to children through several generations.

Diseases of the Heart occupy the sixth place in the order of the causes of premature death. These diseases are, with few exceptions, the results of pre-existing morbid conditions, which would fall within other categories. Thus they are determined by scarlet-fever, by rheumatism, by gout, by syphilis, by degenerative disease of the kidney, tubercular disease, &c. Heart-disease is also one of the morbid conditions brought about by excessive indulgence in alcoholic drinks. Finally, the heart-disease of mid-life and advancing years is not unfrequently the result of the degeneration of tissues, prematurely manifested, which characterises the normal degeneration of old age. It is not until after the twenty-fifth year of life that heart-disease begins to assume a prominent position as a cause of premature death, and it becomes more and more prominent in each succeeding decade until the age of seventy-five years. Very much of the fatal heart-disease of manhood and mid-life has been the slowly developed consequence of mischief in the organ determined by scarlet-fever in childhood, and rheumatic fever during adolescence.

Diseases of the Digestive Organs come seventh in order as causes of premature death. Of these diseases those characterised by looseness of the bowels, the diarrhoeal diseases, to-wit, diarrhoea, cholera morbus, and flux (dysentery) stand pre-eminent. The cholera, to which reference has been made before in the section on infectious diseases—malignant cholera—must not be confounded with the common cholera of this climate. We know malignant cholera in this country only as an imported disease; but the home-bred cholera, although resembling the malignant in some of its symptoms, has a wholly different history in its development. It is true that the diarrhoeal diseases noted in this section, namely, simple cholera, diarrhoea, and dysentery, are governed in their prevalence by the like local conditions which govern the prevalence of malignant cholera, and also of enteric fever, namely, conditions of excremental pollution of air, of soil, or of water. But in the case of the cholera morbus, ordinary diarrhoea, and bowel flux, these seem to be determined as to prevalence by the products of the common putrefaction of excremental filth at certain seasons of the year, especially in the later summer and autumn, and particularly by high ranges of temperature at these seasons. On the other hand, while malignant cholera and enteric fever equally have close relations as to prevalence with the existence of putrefying excremental filth *something else* than the ordinary products of putrefying filth is needed to make the filth operate in predisposing the system to or determining an attack of either disease. This *something else*, the nature of which is still undetermined, but which appears to be closely, if not inseparably, connected with the discharges of the sick of the diseases, is denominated, for convenience sake, *specific*.

The general doctrine of *diarrhoeal diseases*, in all their forms, is thus set forth by John Simon:—

"Nothing in medicine is more certain than the general meaning of high diarrhoeal death-rates. The mucous membrane of the intestinal canal is the excreting surface to which nature directs all the accidental putridities which enter us. Whether they have been breathed or drunk or eaten, or sucked up into the blood from the surfaces of foul sores, or directly injected into blood-vessels by

physiological experiments, there it is they settle and act. As wine 'gets into the head,' so these agents get into the bowels. There, as the universal result, they tend to produce diarrhoea—simple diarrhoea in the absence of specific infections; specific diarrhoea when the ferments of cholera and typhoid fever are in operation. And any such [irregular] distribution of diarrhoeal disease as has just been noticed warrants a presumption—indeed, so far as I know, a practical certainty—that *in the districts which suffer high diarrhoeal death-rates, the population either breathes or drinks a large amount of putrefying animal refuse.*"

The remaining four classes of causes of premature death do not call for much detailed remark. Of *accidents, homicide, and suicide*, it is necessary to observe that much fatal accident is still a result of heedlessness and recklessness, not always on the part of the sufferer, but upon the part of those who are morally responsible for his safeguard when placed in circumstances involving danger to life by mechanical means. We need legislation providing for the fencing of certain forms of machinery in manufactories. The loss of life by accident in these factories, now so formidable, would then be very largely obviated.

If now we endeavour to bring together, in one connected view, the different conditions under which the numerous causes of premature death operate, supplying for this purpose such missing links in our detailed account as may be necessary, we shall find that, notwithstanding the great variety of causes as indicated by the large number of names of fatal diseases, these conditions admit of arrangement into three broad categories, namely, (1) as relates to the individual; (2) as relates to his nourishment and habits; (3) as relates to his surroundings.

(1) *Conditions relating to the Individual.*—Notwithstanding the brevity of the references which have been made to inherited vices of the body, it must have been obvious from these how immeasurably an important part these vices play in fostering premature death. Now, let it be clearly understood that in the different bodily vices to which attention has been directed—those degenerations of race which are still so largely observed among all classes of

the community—we are witnessing the effects continued through generations, and exaggerated with each generation, of unwholesome conditions of life, which still exist and are still actively operating among us. Very much of the fatal influence of these inherited vices of constitution are hidden under the names of the assigned causes of death. The medical man is called upon to register as the cause of death the more immediate morbid conditions giving rise to death, not the remoter. But very commonly the immediate conditions are but an accidental or casual indication of the remoter condition, the inherited vice of constitution. As it is, however, under the terms "atrophy and debility," "scrofula," "premature birth," "teething," "convulsions," numerous deaths of infants are recorded who have been born immature; and these constitute but a portion of deaths which originate in the immaturity and defective viability of the infant, hidden under other names. The liability to give birth to immature and non-viable children is one of the most marked characteristics of degenerated races. But the children born of these races who escape the perils of infancy are too apt to carry with them into later life the impress of their origin, with its proclivities to certain forms of fatal disease, and to succumb to affections which, although designated by some names indicative of local mischief, are in reality manifestations of an original vice of constitution. Hence, the propagation of these degenerated races holds a foremost place among the conditions which promote premature death.

(2) *Conditions relating to nourishment and habits.*—Privation plays an important part, as has been pointed out, in the development of typhus and of relapsing fever. But the less obvious results of privation enact even a more important part in promoting premature death than is shown by the instances cited. Privation, as destitution, is one of the most active agencies concerned in bringing about degeneration of race. It is, also, a most potent direct source of infantile mortality. Further, it exercises a powerful influence over the course of numerous diseases diminishing the chances of recovery from these, or accelerating their fatal consequences. In various modified forms, moreover, it tells evilly on the health

condition of large sections of the population. Modified forms, of great practical importance, are brought about by the practice of adulteration or falsification of articles of food, which exist so largely. The recognition of these different forms of privation becomes an important element in the medical man's efforts to obviate the fatal consequences of certain diseases.

Then the habits of indulging in alcoholic liquors or narcotic herbs exercises a supremely momentous influence in the promotion of premature death. Of alcoholism as a cause of degeneration of race (with all its consequences), as a cause of numerous fatal diseases of the digestive and urinary organs, as sapping in innumerable ways the sources of life, with or without the help of an excessive use of tobacco and of opium, who can tell the whole story?

But while the excessive use of intoxicating liquors must be ranked with destitution in all its forms as a condition promoting premature death, it must not be forgotten that if, on the one hand, it is one of the most formidable causes of degeneration of race, on the other hand degeneration of race is one of the most potent sources of the passion for intoxicating drink. Moreover, if again, the excessive use of intoxicating drink is a fertile source of destitution, destitution itself, on the other hand, promotes such excessive use.

3. *Conditions relating to the Individual's surroundings.*—These conditions mainly concern the air he breathes, the water he drinks, and the soil he lives upon.

(a) *The Air.*—This is fouled in various manners, each manner contributing, and some in a particular fashion, to the fouling. The houses we live in, from their construction or from the way we occupy them, are too often principal sources of pollution of the air we breathe. They may be insufficiently lighted, or insufficiently provided with means for the inlet and outlet of fresh air, and so contribute relatively or directly to overcrowding. They may be imperfectly drained and unfurnished with means for the safe disposal

of excremental or other filth, so that the air within them is laden with the products of putrefying organic matter, which the drains and depositories of filth failing of their proper functions, retain in and about them. To so large an extent does this pollution of the air of dwellings prevail—a pollution, as we have seen, which is concerned in the production of some of the most widely fatal diseases causing premature death, to-wit, phthisis, malignant cholera, simple cholera, enteric fever, diarrhœa, dysentery, &c.—that we have it stated on official authority as follows:—

“There are houses, there are groups of houses, there are whole villages, there are considerable sections of towns, there are even entire and not small towns, where general slovenliness in everything which relates to the removal of refuse-matters—slovenliness which, in very many cases, amounts to utter bestiality of neglect, as local habit; where within or just outside each house, or in spaces common to many houses, lies for an indefinite time, undergoing fetid decomposition, more or less of the putrefiable refuse which house-life, and some sorts of trade-life, produce: excrement of man and brute, and garbage of all sorts, and ponded slop-waters: sometimes lying bare on the common surface; sometimes unintentionally stored out of sight and recollection in drains or sewers which cannot carry them away; sometimes held in receptacles specially provided to favour accumulation, as privy-pits and other cesspools for excrement and slop-water, and so-called dust-bins receiving kitchen-refuse and other filth. And with this state of things, be it on large or on small scale, two chief sorts of danger arise: one, that volatile effluvia from the refuse pollute the surrounding air and everything which it contains; the other, that the liquid parts of the refuse pass by soakage or leakage into the surrounding soil, to mingle there, of course, in whatever water the soil yields, and in certain cases thus to occasion deadliest pollution of wells and springs. To a really immense extent, to an extent indeed which persons unpractised in sanitary inspection could scarcely find themselves able to imagine, dangers of these two sorts are prevailing throughout the length and breadth of this country, not only in their slighter degrees, but in

degrees which are gross and scandalous, and very often, I repeat, truly bestial."¹

As to occupation of houses; overcrowding of families therein, and the pollution of air thence arising, is an evil of very wide prevalence, giving occasion on the one hand to large development of fatal lung-disease, tubercular or other; and on the other contributing to—in some cases determining—the existence of typhoid, and under all circumstances favouring the spread and fatality of the infectious diseases.

Then there are the air-pollutions occurring in work-shops in the pursuit of the different trades, and which exercise so marked an influence in causing local excesses of prevalence of lung-disease.

(*b*) *Water*.—The most hurtful source of the pollution of water—the soakage or passage into wells and springs of decomposing organic refuse, and particularly putrefying excrement, has been noted in the previous section on Air. In so far as water is an important agency in promoting premature death, this for the most part depends upon its pollution with putrefying organic refuse, and especially excremental filth. Sickesses arising from certain excesses of mineral matters in water do not appear, as a rule, to exercise a marked influence in the promotion of premature death. The influence of water polluted with putrefying organic filth is seen in the production by it of fatal diarrhoea and dysentery, and in the propagation of enteric fever and malignant cholera. There is something inexpressibly revolting in the notion of persons and communities drinking water mingled with their own excrement, and yet it is one of the commonest facts of every-day life; and in addition, as we now know, excrement-polluted water is not rarely given to our infants and young children mingled with the milk on which they are fed.

(*c*) *Soil*.—The part of the soil in the promotion of premature death is as a source of pollution of the air we breathe and of the water we drink. The soil is the great laboratory in which the great mass of solid and liquid filth of those who live upon it undergoes

1. John Simon: 'Supplementary Report of Medical Officer of Privy Council and Local Government Board, 1874,' p. 15. New Series, No. 11.

its final decomposition and resolution into harmless elements. But when this soil becomes surcharged with filth its wholesome action ceases, and the changes which the filth undergoes within it commonly stop short at a period when its products are harmful to those living upon it. These products are taken up by the water in the soil and carried into the springs and wells, and they are also given off into the air above the soil by the movements of the air within the soil outwards, as it is influenced by the varying level of the sub-soil water, by variations of pressure in the atmosphere, and by other circumstances which go to bring about the breathing, so to say, of the sub-soil.

The atmosphere in its general aspects must be included among the surroundings of the individual active in some of their phases as a source of disease. But this action as represented in vicissitudes of weather and its relations to season may be regarded as uniform in its operation over large districts or over an entire country; and until the operation of locally existing fostering causes of fatal disease can be eliminated we shall be unable to discriminate the precise part which atmospheric changes play among the conditions under which the causes of premature death operate.

THE PREVENTION OF PREMATURE DEATH.

ENTERING now upon the subject of the *prevention of premature death*, two principal questions, in view of what has gone before, present themselves for consideration in this relation, namely:—

First, there is the question of dealing with, in order to their avoidance, the conditions under which the causes of premature death operate, which have been bequeathed to us; and

Secondly, there is the question of dealing with the conditions which, as dealt with, would inevitably repeat, multiply at every stage, and perpetuate the first-named conditions.

A clear apprehension of the bearing of these questions is necessary to a right estimate of the subject now under consideration.

1. By far the greater proportion of the local conditions which have been enumerated as fostering premature death is a legacy from previous generations. Thus large sections of our city were built in times when sanitary knowledge did not exist as now understood, and the arrangement of the streets and houses, as well as the construction of the latter, were governed by local prejudices and individual views of comfort and utility, irrespective of considerations of wholesomeness. Contracted rooms of low ceiling, ill lighted, and without any other than accidental provision for the movement of air in them were the rule. Further, the rule was for all domestic filth, of every sort, to be deposited in or about the house, within deep cesspools sunk beneath the house or great receptacles outside, often of the capacity of the largest room of the house; while, sunk promiscuously in the soil upon and within which these great reservoirs of filth existed, their liquid contents soaking into it, were the wells from which the water for domestic use was obtained.

Now, these bequeathed conditions of unwholesomeness are too often of a sort beyond reach of palliation. The brick-and-mortar jungles and wooden rookeries are utterly beyond the reach of true sanitary amendment. There is but one way of dealing with habitations of the kind here referred to, and that is by *destruction*. Fortunately they are perishable and new structures are rapidly taking their place.

The sections of the population exhibiting degeneration, as previously described, must also be regarded as part of the bequeathed conditions which foster premature death; and the members of these sections who, by reason of the extent of degeneration manifested by them, whether as shown in disablement of body or of mind, form a large body of permanently destitute persons, come within the category. Indeed, much of the destitution which exists is to be regarded as a legacy from previous generations, occurring, as it does, among a class of the population which by successive deteriorations have reached a state of physical and mental incapacity which unfits them from earning at the best more than a bare subsistence, or which, as previously stated, renders

them permanently destitute. Destitution is here, then, considered as one of the results of a preceding condition of things, of which the consequences, so far as those relate to habitation and the ordinary surroundings of life, have been described in the previous paragraphs. In organised measures for the relief of destitution under Poor Laws, we might have one of the most powerful means for arresting the further progress of degeneration in this direction.

Let it be observed of the first question here considered, that it relates to conditions for which the present time is not responsible; which we have had bequeathed to us by our forefathers; of which we are reaping the evil results sanitarily; which have to be dealt with specially; and which wherever so dealt with must necessarily largely anticipate the measures for obviating the conditions fostering premature death which enter into the second question.

II. We come now to a consideration of the conditions fostering premature death which belong to the second question stated. These are conditions of every-day life which, undealt with, perpetuate the semi-barbaric stage of civilization in its health-aspects and, to be successfully dealt with, need continuous every-day attention. They are of two sorts, the one relating to the *individual* alone; the other to the individual in relation to others—in short, to the *community*.

In dealing with the personal care of health, it has become customary to treat of man as if he were an abstract personage, capable of procuring for himself and doing for himself all that was necessary for the maintenance of his corporeal and mental well-being; he is taught the qualities of good and of bad air, of good and of bad water, of the requirements of wholesome houses, of the characteristics of healthful food, of the due regulation of exercise and habits. He is taught all these things, not as vague generalities, but as matters of precise knowledge which involve a high degree of moral responsibility in their application. All this is an essential part in the great process of health-education now going on, and is producing excellent and progressively increasing results. But this teaching has been, and is still, too much dissociated from the actual facts of the circumstances under which man lives in a civilized country.

The vast majority of individuals are dependent for the sort of air they breathe, the water they drink, the homes they inhabit, the food they consume, the opportunities of relaxation they may have, and even of the habits they form, upon others, and they can bring to bear but an infinitesimal influence over these all-important elements of their physical welfare. How many of us can exercise the slightest control over the qualities of the water we drink, or of the air we breathe, the construction of the houses we inhabit, the quality of the food we have to eat, or our physical habits? We are, for the most part, the slaves of our purse and our occupation, and unable to help ourselves in these matters, *except as we act together as a community*. It is at this point where our ordinary health-teaching mainly fails, namely, in *neglecting to show the circumstances under which individuals can only obtain sanitary essentials by conjoint action, as a community, and to what extent and in what matters the Legislature has made provision for such conjoint action*. The chief impediment to sanitary progress at this moment is the want of a just knowledge of the relations of the *community* to sanitary work, and the consequent misapprehensions of individuals and the insensitiveness of communities on this subject. What is now mainly wanted, in view of the furtherance of sanitary work, is an acuter sense among individuals generally of their common rights and common powers in sanitary matters.

Here, then, leaving the personal question as beyond the jurisdiction of the health office, it is proposed to indicate the provision which the law has made for the prevention or avoidance of those fostering conditions of premature death which come within our second question, the conditions of every-day life. We shall deal with these in the order in which they have been summarized, first touching upon *privation*, and then in succession upon *alcoholism*, upon *air, water and soil*, in their sanitary relations, including the consideration of the *home* and the *workshop*, and the *conditions of work*; and finally, the question of *infectious diseases* will be dealt with.

1. *Privation*, as we have endeavoured to show, is one of the most potent elements in the promotion of premature death; and the

administration of relief to the poor, as it obtains in this city, has a sanitary aspect of the greatest moment. This has not been recognized by the Legislature. Measures especially designed to give unity of action in the administration of Poor-law and of Sanitary-law, rightly applied, would add to the efficiency—indeed, are necessary to the efficiency—of each other. This design might not prove effective in operation, and the important object aimed at by the amalgamation might be largely frustrated. It would be a great gain, however, to have legislative recognition of the essentially sanitary aspect of some of the phases of poor-relief.

In so far as privation, in its less recognized forms, may arise from the unwholesome preparation, the fraudulent sophistication, or the improper state for consumption of articles of food, the Legislature has not been wholly unmindful of the needs of communities. Statutes and ordinances provide for the due regulation and proper cleanliness of bakeries, and for the obviation of those causes which tend to render the bread made in them filthy and unwholesome; provide for detecting adulterations of articles of food and drugs, and for the punishment of adulterators; and finally, provide that an officer of health may inspect any animal, carcase, meat, poultry, game, flesh, fish, fruit or vegetables, exposed for sale, and seize the same, if any of such articles appear to him diseased, unsound, unwholesome or unfit for the food of man. Statutes and ordinances also provide for the punishment, by fine or imprisonment, of any person exposing articles in the condition named for sale.

The measures here referred to give very large powers for dealing with sophistications of articles of food injurious to health but do not adequately provide for their administration.

2. *Alcoholism.*—The excessive use of intoxicating liquors as a fostering condition of premature death is one of the most difficult questions in social administration. It must be confessed that the most obvious agency in controlling habits of drinking is the direct action of the police and the punishment inflicted by magistrates for drunkenness. The question of dealing with the excessive use of intoxicating liquors is, however, at the root a moral one, and must

ultimately rest mainly with the pulpit. But in so far as this excessive use is a result of the degraded condition in which some of our population live, and of a craving which is one of the most significant indications of the mental and physical deterioration which we have described, the abatement of the excessive use of intoxicating liquors will only follow, step by step, upon the removal of these conditions. A primary element in the prevention of the excessive use of intoxicating liquors is the amelioration of the sanitary state of the population.

3. *The Air in its relations to the Home, the Workshop, and the Community.*—The air we breathe, with reference to its purity, requires to be considered in relation to the house we live in, the places we work in, and, incidentally, the conditions of that work, and to the community of which we form a part. The law makes large provision, in aid of individual action, to secure purity of air under the several circumstances mentioned. This provision takes only a single form. This form is directed to the immediate obviation of conditions which pollute the air in various ways injurious to health, and to the prevention of their recurrence—the removal of *nuisances*, in short. Another form should be directed to secure such structural arrangements of houses and groups of houses as will obtain for them the essential conditions of wholesomeness, and will prevent the repetition of those traditional modes of building which have proved the most formidable obstacles to sanitary improvement. In addition, factories, work-shops, and work-places should be regulated by several special laws.

Houses.—If now we turn to the structural conditions of houses, we find lack of provisions made for securing and maintaining their healthfulness. Power should be given to the sanitary authority to make regulations as to houses with respect

- (a) To the construction of walls, foundations, etc., for purposes of health;
- (b) To the sufficiency of the space about buildings to secure a free circulation of air, and with respect to the ventilation of buildings; and

- (c) To the drainage of buildings, to water-closets, earth-closets, privies, ash-pits, and cesspools in connection with buildings, and to the closing of buildings or parts of buildings unfit for human habitation, and to prohibition of their use for such habitation.

Unfortunately provisions do not exist for securing from the beginning the fitness for occupation of a house, as fitness is now understood. There is no place where a new house is erected, where such provisions, modified according to circumstances, are not needed. The evils of imperfectly constructed and arranged houses are universal, and the means to prevent ill-construction and arrangement should be universal also.

Laws should exist for regulating the conditions under which particular trades are pursued. These laws should relate to the general sanitary condition of the factories and workshops to which they refer, the safety of the individuals employed from accidents liable to be caused by machinery, the duration of the occupation of children and young people, the time to be given for their meals and the places for eating them, the days to be set apart as holidays and half-holidays, the education of the children employed, and the fitness of the children for employment. Special provisions should include the cleanliness of workshops and the means of ventilation, particularly in cases where the manufacture carried on in them produces much dust or otherwise injuriously fouls the air. Very important restrictions should be placed upon the employment of children or young persons, or both, in trades directly injurious to health, and in certain trades involving night work. Such provisions, indeed, would touch the core of some of the most important sources of physical degeneration, and put under control the most formidable of the conditions, which contribute to produce excessive prevalence of lung-disease, including phthisis.

Although if every house and workshop were made free from unwholesome conditions, the aggregation of which they form a part would be equally free, such freedom cannot be accomplished with respect to the commoner conditions of nuisance except by the

community acting as a body. The drainage of the houses requires a common system of sewerage for its efficiency; and general cleanliness and the regulation of thoroughfares, or of markets, or slaughter-houses, and the prevention of unwholesome conditions therein, also the regulation of offensive businesses, is possible only on condition of the community as a whole undertaking, through its representatives, the several duties.

Water.—A community should not have less power in supplementing individual action in respect to water than it has with respect to house-construction, drainage, sewerage, and the abatement of nuisances, trade or other. This power may be exercised either in procuring a general supply or in developing and guarding particular supplies from wells, springs, &c.

The Soil.—The sanitary law in this respect is still defective. It does not contain express provisions which would secure proper drainage of the soil, or which would prohibit the erection of dwelling-houses upon soils, such as the made earths produced by the deposits of domestic refuse of all kinds which are unfit to form sites. Such drainage and purification as a soil may receive from the agency of the sanitary authority is usually incidental to the cleansing of the surface, the removal of domestic refuse, and the prevention, under certain conditions, of the deposit of such refuse in cesspits and privy-pits. In view of what we have said as to dampness of soil being a condition of phthisis, it would seem that special provisions for the drainage of the sub-soil, and furthermore for the prevention of building upon accumulations of town refuse or organic refuse of any sort are needed.

Infectious Diseases.—Infectious diseases, by reason of their infectiousness, require separate consideration in reference to their prevention. In so far as their prevalence may be affected by overcrowding, by conditions of uncleanness of habitation, by nuisances from accumulations of filth, by improper drainage and sewerage, or by polluted water or soil, the different provisions of the sanitary laws are entirely inadequate. But it is practicable to deal with some infections independently of the conditions which may

favour their action. In this respect small-pox stands alone among the several infectious disorders. In vaccination we possess an *absolute* preventive of this disease, if we were to use it properly; but in other infectious diseases we are restricted in our efforts of direct prevention to the isolation of cases. Isolation is also an important means of dealing with small-pox when present among a community; but while it is the sole means with which we can effectively combat scarlet fever, diphtheria, typhoid, &c., with respect to small-pox we possess a surer preventive agent in vaccination.

The prejudice entertained by some persons against vaccination is, in reality, the result of ignorance of small-pox. The diminution of small-pox in its severe forms since the introduction of vaccination has been such that comparatively few persons living are familiar with the disease and the horrible disfigurement it is apt to give rise to in the unvaccinated when not fatal. The evil being unfamiliar is undreaded, and the sure means of prevention undervalued or decried.

With respect to infectious diseases generally, the laws provide that the sanitary authority may isolate the infectious sick; may destroy infected bedding; may provide means for the disinfection of infected articles of bedding and clothing; may provide also a proper carriage for the conveyance of the infectious sick. The same laws also enable the sanitary authority to cleanse and disinfect premises, and prohibit the exposure of infected persons or things.

The several provisions of the Sanitary Laws which have been here enumerated would have been of little avail if no arrangements had been made to secure their execution. Although these laws are still to a regrettable extent permissive only, not compulsory, still there are important parts of them which the sanitary authority is required to carry into effect.

HISTORY OF THE RIVER NUISANCE DURING THE PAST YEAR.

"It is of the utmost practical importance to recognize in regard of Filth, that agents which destroy its stink may yet leave all its main powers of disease-production undiminished. Whether the ferments of disease, if they could be isolated in sufficient quantity, would prove themselves in any degree odorous, is a point on which no guess need be hazarded; but it is certain that in doses in which they can fatally infect the human body they are infinitely out of reach of even the most cultivated sense of smell, and that this sense (though its positive warnings are of indispensable service), is not able, except by indirect and quite insufficient perceptions, to warn us against risks of morbid infection. Even as regards the positive notices which we receive by the sense of smell with regard to putrefactive decomposition, we must not assume that the diffusion and potency of septic ferment in the air necessarily go *pari passu* with the diffusion and offensiveness of the foetid gasses:—Witness, on a very large scale, the experience of London in the summer of 1858, when, as persons who were then frequenting Westminster may well remember, our tidal river, enormously charged with decomposing sewage, stank week after week in a degree which excited much public alarm as to the possible consequences of the nuisance, and even led to an immediate interference of the Legislature; but when, though the quantity of sulphuretted hydrogen in the river-atmosphere was such as rapidly to blacken the ordinary chemical test-papers, as well as to affect in the same way the lead-paint of vessels on the river; and was enough also to produce among persons much engaged on the river such signs of sulphide-poisoning as I have above mentioned, the particular ailments which attest the working of septic ferment on the human body were in even less than average prevalence among the unwilling subjects of this large experiment."—JOHN SIMON.

HISTORY OF THE RIVER NUISANCE DURING THE PAST YEAR.

In my first annual report I discussed at considerable length the questions of sewers, sewage and sewer gas, and denounced with sufficient emphasis the system of running all the foul drainage of the city into the rivers. Changes in the system were not even considered in the Common Council. In the months of July and August, the season being unusually dry, the rivers became exceedingly offensive. The press, echoing the indignation of the people, made a sudden and very emphatic onslaught on the municipal government for its negligence. The Council especially was lashed with unmeasured sensational sarcasm. The city fathers were aroused and a special session of the Council was called to meet on the 12th of August, to take into consideration the great river nuisance. At that meeting, the Commissioner of Health sent in the following

COMMUNICATION:

To the Honorable the Common Council:

At an extra session of your body, called especially to consider the great and distressing nuisance caused by the foul condition of the rivers running through the city, you will reasonably expect a communication on the subject from the Commissioner of Health. In a lengthy communication, last year, I discussed the evil in question and gave scientific and uncontroverted reasons for my conclusions. That communication and much other matter on the same subject appeared in my annual report several weeks ago. I

said therein: "We must cease to put filth in the rivers if we wish to abate the great and increasing nuisance." It has been said by certain newspapers, and is now publicly reiterated, that I suggested no remedy, yet the following language occurs in my report: "The engineering problem is narrowed down to the construction of sufficient intercepting sewers, running parallel with the rivers on each side, receiving and carrying off all the drainage which now empties into the open streams." I added, in a spirit of courtesy to another department of the municipal government: "How these intercepting sewers shall be constructed, is a problem for the City Engineer and the Commissioners of Public Works. All that I ask is, that such sewers shall improve the sanitary condition of the City and not make it worse." The present agitation may be productive of good, for it arouses public attention and intensifies public feeling in regard to a great sanitary evil. It also brings to bear public opinion upon the municipal legislative body. It is a singular thing that legislative bodies, the world over, are much slower than public opinion in regard to sanitary measures. The present agitation may also be productive of evil, for it may lead to ill-considered action, involving a large outlay of money, useless or worse than useless in results. Then the same people who are now belaboring the Council for its inertia would curse it for its rashness.

It behooves those who are the sworn guardians of the public interest to keep cool in the midst of a storm, and to act with prudence and judgment. Yet let us remember that to act with prudence and judgment does not mean needless delay, still less indifference to the comfort and health of the people.

The fundamental fact in the discussion, the fact in regard to which there will be no dispute, is this, that no sewage should be put in the rivers; it should be disposed of in some other way, and that other way should not produce a nuisance.

Some temporary relief may be afforded by flooding the rivers, in the meantime, but the only radical and permanent cure is not to pollute their waters with sewage. We have, then, to consider the two questions of temporary relief and radical cure.

It will help us to a practical understanding of the subject, to begin with a clear notion of what sewage is. The British Association Committee define it as all refuse of human habitations affecting the health of the country. The first report of the Rivers Pollution Commissioners of England gives the following general description of sewage:

Sewage is a very complex liquid; a large proportion of its offensive matters is of course human excrement discharged from water-closets and privies, and also urine. But mixed with this is the water from kitchens, containing vegetable, animal, and other refuse; and that from wash-houses, containing soap and the animal matters from soiled linen. There is also the drainage from stables and cow-houses, and that from the slaughter-houses, containing animal and vegetable offal. In cases where privies and cess-pools are used instead of water-closets, or these are not connected with the sewers, there is a still large proportion of human refuse in the form of chamber slops and urine. In fact sewage cannot be looked upon as solely composed of human excrement diluted with water, but as water diluted with a vast variety of matters, some held in suspense, some in solution.

A moment's reflection will enable you to see that sewage varies in its composition, not only in different places, but at different times in the same place. An average sample of it contains, in 100,000 parts, 72.20 parts of solids in solution and 44.69 parts in suspension. Observe that there is a great deal more in solution than in suspension, and do not forget the difference between solution and suspension. Substances in solution will not settle. Weak brine is water with salt in solution. The salt will not settle, however long and however still the water may stand. Mud and other substances may be suspended in water, but they will fall to the bottom more or less if the water remains at rest. In sewage, the parts that will not settle at all are 72.20 in 100,000, while the parts that will settle to some extent are only 44.69 in the same number. Let us take a step further. The parts that are held in solution, or will not settle under any circumstances, are much more poisonous than the parts that are in suspension, or will to a certain extent settle. Of the 72.20 parts that are dissolved, or held in solution, there are 4.696 parts of organic carbon, 2.205 of organic nitrogen, 6.703 of ammonia, and 10.660 of chlorine; while of the 44.69 parts that are

not dissolved, or held in suspension, 24.18 are mineral and 20.51 are organic.

From which is demonstrated the folly of attempting to get any considerable relief from dredging at the mouths of the sewers. The greater part, and the worse part, of the sewage cannot be precipitated at all. Hence it will not be found at the end of the sewers. It has become a constituent part of the water, from which it can be separated only by evaporation. Only a very small portion of matters held in suspension is precipitated at the mouths of the sewers. The accumulations at those points are mostly innocent sand washed down from the streets. Somebody has even proposed to put catch-basins at the mouths of the sewers, to intercept the foul matter. You might just as well undertake to make sugar by running sap through catch-basins.

Dilution of the sewage would afford some temporary relief. Various schemes have been devised for that purpose. Some think that a channel might be cut from the lake to the river below the dam. It might be cut, but the water could not run up hill through it from the lake to the river. On the contrary, the water would run down hill through it from the river to the lake, leaving the stream below that point more sluggish and foul than ever. Water doubtless could be pumped over from the lake. A better way would be to let everybody use three times as much water as is now used, which would dilute the sewage in proportion. It would cost more to pump the water through the reservoir than through a tunnel, but the cost of digging the tunnel would be saved.

Flushing from the dam has been proposed as a remedy for this great ill. Mr. Whittemore, engineer of the St. Paul Railroad Company, has demonstrated the impossibility of such a scheme. There is far less water in the dam than there is in the river below the dam. If the water were all let out at once it would make no sensible improvement. Mr. Whittemore has shown that in dry weather the entire flow of the river for fifty-five days amounts to only as much water as there is in the river below the dam. Moreover, the evaporation is almost equal to the flow. How, then, can we make that small stream available for safely diluting 1,000,000,000

gallons of accumulated sewage, stinking under our noses in the heart of the City? And the Menomonee river will soon be worse than the Milwaukee river, with no current at all, and less flow than a street hydrant. Besides, if the dam were let off, the banks above would soon reek with malarial effluvia, bringing down upon the city from outraged holders of adjacent property a hundred indefensible suits for private damages.

Let us go sixty miles away and tap Lake Winnebago, say others. Fed by two great rivers, the Fox and the Wolf, Lake Winnebago has an abundance of water for such a purpose without robbing the manufacturing towns on its outlet. There is one little difficulty, however, in the way. It would be necessary to deepen the channel of Milwaukee river over a hundred feet, even as low down as West Bend. The whole problem of temporary relief, then, is narrowed down to pumping lake water into the river for the purpose of diluting the sewage which it contains. Shall this be done by constructing a tunnel and erecting pumping works for the special purpose? or shall we temporarily double or treble the waste of water in order to dilute the poison which is emptied into the open and stagnant streams?

Which process will be the more costly? Of course, it would be more expensive to lift water eighty or ninety feet high into the reservoir than to lift it ten feet high from the lake into the river. If the arrangement were designed to be permanent, this would settle the question at the outset. The tunnel and the pumping works connected with it would be useless as soon as a permanent remedy could be applied. An extra pumping engine, which would be required to give us twice or thrice as much water as is now used, would be needed in the future, and therefore would be no loss. The cost of the tunnel plus the cost of pumping through it for three years (and a temporary arrangement should not continue longer), would stand against the cost of pumping alone through the reservoir.

Our present waste of water makes the river nuisance bearable except during two months of the year. A much larger waste might render it supportable during the whole year, till we could make

arrangements for the proper disposal of sewage. A waste of water all over the city would add to the comfort of the people, would wash out the sewers, and would absorb great volumes of sewer gas, while it would reach the river nuisance in its various fountains.

But what shall be the cure for the evil? In other words, what shall we do with the sewage?

I proposed intercepting sewers,¹ a year ago, and was regarded by many as visionary, utopian and impracticable. I have studied the topography of the city considerably more since, and now regard intercepting sewers as very likely to increase the nuisance, if we should ever have the misfortune to get them. Fifteen miles of them would be required along the three rivers dividing the city. There is no outfall for such huge sewers, and they would cost vast sums of money. They would cost as much as an independent sewer system for drainage of habitations, which in my judgment would be the best permanent cure for the evil.

The immediate and pressing necessity is to provide for temporary relief, either by running a tunnel from the lake to the river, or by giving the people more water to waste. The question of a permanent plan requires deliberate consideration, but should not be postponed till irreparable calamity falls upon us in the form of epidemic disease. I am ready at any time to give my views at length in regard to the independent and supplementary system, to which I have here barely alluded, if the Common Council shall desire it.

The first thing to be done, in my judgment, towards a radical cure of the evil is to employ an able sanitary engineer, of national reputation, whose opinions will have weight and authority, to make a sanitary survey of the city and report a proper plan to the municipal government. A hydraulic engineer is not sufficient.

1. It was not at all in my mind to claim that the idea of intercepting sewers was original with me. Nobody can put forth any such claim. The idea is as old as sanitary engineering.

Neither is a sanitarian sufficient. Both should be combined in one person to form a wise and comprehensive judgment of our needs.

Respectfully submitted,

O. W. WIGHT, M. D.,

Commissioner of Health.

A COMMISSION PROPOSED.

At the same special meeting of the Council the following resolution, drawn by the Commissioner of Health, was introduced by one of the aldermen:

Resolved, by the Common Council, that, for the purpose of investigating the great public nuisance caused by the foul condition of the rivers in the City of Milwaukee, and for the purpose of seeking a proper remedy for the same, a commission of five be and hereby is created, said commission to consist of the City Engineer, the Commissioner of Health, one Alderman to be appointed by the President of the Council, and two citizens to be appointed by the Mayor, such appointments to be made within one week after the adoption of this resolution, and the commission aforesaid to remain in existence one year from the time of its completion. It shall be the duty of said commission to employ the services of some eminent sanitary engineer, of national reputation, whose opinions shall have weight and authority, to make a sanitary survey of the city, with the purpose of ascertaining the best method of permanently abating the nuisance aforesaid, and to make a report of such survey to the Mayor and Common Council. It shall be the duty of the commission aforesaid to report to the Mayor and Common Council what measures are necessary for removing the evil and the cost thereof. All the necessary and legitimate expenses of said commission shall be audited in the same manner as other incidental expenditures and paid from the general fund of the city, only the amount to be paid to the sanitary engineer employed as herein provided shall first be submitted for the approval of the Common Council, and members of the commission shall receive no personal compensation for their services, except the City Engineer and the Commissioner of Health, who shall receive their salaries as city officers, and nothing extra.

The foregoing communication and resolution, together with other communications and resolutions, were referred to a special Committee of five, to which committee were added the City Engineer, the Board of Works and the Commissioner of Health. The committee held several sessions and discussed the question of

abating the river nuisance in a somewhat desultory manner. A majority of the committee agreed upon a report, the gist of which is contained in the following extract:

"Your committee is therefore of the opinion that the whole sewage of the city should be wasted into the lake independent of our rivers through a system of intercepting sewers, using the present sewers to carry the sewage proper into these receiving sewers, and that the storm water should by proper overflows be emptied into the rivers. With that object in view we herewith present a resolution for plans and estimates for intercepting sewers, and recommend its passage."

The Commissioner of Health drew up and with one of the Commissioners of Public Works submitted to the Council at a regular meeting, September 1, 1879, the following

MINORITY REPORT.

To the Honorable the Common Council.

A majority of the committee to whom were referred the questions submitted to the Council at its extra session, called to consider the river nuisance, have adopted a report, accompanied by resolutions, from which the undersigned in part differ. As briefly as possible the grounds of dissent will be herein presented. The Commissioner of Health has in the meantime carried out a systematic investigation, taking a large amount of testimony given by leading citizens and experts, who from their special experience, observation or study, are qualified to present facts bearing upon the complex and difficult subject. The following conclusions have been reached:

(1.) In any thoroughgoing consideration of the subject, the three rivers—the Milwaukee, the Menomonee and the Kinnickinnic, must be regarded as together constituting one nuisance.

(2.) As the rivers are dredged to the same depth they have practically no fall and may be treated as a three-armed navigable inlet of the lake.

(3.) Into this inlet three rivers run, together with the water from the reservoir used by the inhabitants of the city.

(4.) The amount of water in the three-armed inlet is not less than twelve hundred million gallons.

(5.) The amount of water from various sources emptied daily into this inlet during the summer and early autumn months, averages about sixty million gallons.

(6.) Making no allowance for evaporation, nor for central and surface flow, the water in this pronged inlet is therefore not changed oftener than once in twenty days. In some places it is rarely changed at all.

(7.) As the lake along shore changes level a little with shifting winds there is some ebb and flow out and in this triple arm of the inland sea.

(8.) The semi-stagnant water of this forked projection of the lake into the low alluvial land of the shore is badly polluted from various sources and has become an uncomfortable nuisance.

(9.) The chief source of the pollution is the excreta of the inhabitants. One thousand average persons in a community produce daily 2266 lbs. of urine and $177\frac{1}{2}$ lbs. of fœces. (Letheby.) The whole product of human excreta in the city is over 125 tons daily, or over 45,625 tons yearly. A large portion of this gets into the rivers.

(10.) From the kitchen end of our habitations at least half as much more pollution reaches the three-armed ship canal.

(11.) Packing houses and slaughtering places furnish the next important contribution to the filth of the open, triple-branched, central sewer of the city.

(12.) Six or eight thousand horses and mules in public and private stables contribute not very much less than slaughtered animals to the great nuisance.

(13.) The excreta of cattle fed in distilleries, together with wasted slops from the same, add not a little to the evil.

(14.) The rinsings of innumerable sour beer kegs and the washings of various other things at the breweries make considerable sewage, which is in part compensated for by a very abundant use of water.

(15.) The soakings of hides and the spent steepings of bird manure in tanneries are far from being wholly neutralized by the lime water and antiseptic bark juice flowing into the rivers from manufactories of leather.

(16.) All these organic substances become poisons by undergoing putrefactive fermentation, whether they are in the rivers or elsewhere.

(17.) The stinking rivers may not add greatly to sickness and mortality, but they are a discomfort and a terror to the people. They may be the means of making diseases like typhoid fever epidemic.

(18.) Expert chemical analysis and microscopical examination reveal traces of sewage in our drinking water, coming from the elongated, three-tined, open cess-pool of the city. The danger is still small, but it "grows by what it feeds on."

(19.) The organic matters which by putrefying create the evil should not only be kept out of the rivers but should be removed from the city before putrefaction takes place.

(20.) Dry removal every day is cheapest and best. Such matters are then valuable to the surrounding country for manure. But if the people will not so have it, legislation in that direction is worse than useless.

(21.) "Water carriage," so called, or removal, through a sewerage system, has been adopted and perhaps must be continued. Organic matters thus diluted with millions of gallons of water, are practically worthless for manure and must be got rid of in the cheapest way that is safe.

(22.) It is a sanitary law, which cannot be disobeyed without danger to the public health that organic matters constituting sewage must be carried entirely beyond the city within twenty-four hours, that is, before putrefaction takes place.

(23.) Our present sewers will not accomplish such an end.

(24.) Intercepting sewers, while they may divert the filth from the rivers, will not radically cure the evil.

(25.) If such intercepting sewers empty into the lower end of the trifurcated bayou, they will only concentrate the evil. If they empty directly into the lake, their mouths will be clogged with ice in winter and sand in the summer; they will probably foul the shore; they will certainly increase the danger to the drinking water, and they will necessitate heavy pumping from the lower to the higher levels.

(26.) A complete system of double-level intercepting sewers for the whole city will be very costly. It will necessitate the removal of the pumping works to Whitefish Bay and greatly increase the danger of sewer gas which already sickens and kills many more than the filthy, three-armed, land-locked "betweenity" that is neither lake nor river.

(27.) The testimony of men with widest experience in dredging the rivers and the conclusions of exact science alike warrant the assertion that nothing is to be gained in the way of relief by removing sediment from the ends of the sewers.

(28.) The great benefit experienced by a heavy rain-fall demonstrates that the evil could be in a measure cured if we had abundant means of flushing at command.

(29.) Flushing one branch only of the trifurcated nuisance would by no means reach the whole evil.

(30.) The question of flushing has not yet been considered with engineering precision and exhaustiveness.

(31.) Disposal of organic and putrescible matter by cess-pools would, in less than a generation, poison the whole earth on which the city stands beyond any possible remedy.

(32.) The plan of a supplementary sewer system, to receive only matters from the inside of buildings, or sewage proper, to be pumped to a safe place beyond the city, needs full consideration and careful estimates of its cost.

The undersigned heartily endorse that portion of the report of a majority of the committee, which recommends the purchase of an additional pumping engine. The public safety requires it, and it will afford considerable extra water for flushing, which will do some good. Conviction compels dissent from the majority report especially in this, that said report totally condemns the plan of dry removal and puts forth the intercepting sewer plan as an exclusive remedy, at the same time giving no general estimate of its cost. The evil is a vast one and needs a more accurate investigation and a more comprehensive consideration than it has received at the hands of your committee. Respectfully submitted,

O. W. WIGHT, M. D., Com. of Health.

W. T. CASGRAIN, Com. Pub. Works.

SPECIAL INVESTIGATION.

In the mean time I had requested many citizens, whose studies or occupations had especially qualified them for giving information on the subject, to meet me at the health office and give the results of their knowledge and experience. The meetings continued through half a dozen sessions on different evenings. The harbor master and the men who have long been engaged in dredging the rivers were called first. Their testimony established the fact that there is very little deposits of putrefying solids on the bottom of the streams running through the city. They all said that the water itself, in hot weather, stinks worse than the material dredged up from the beds of the rivers. The butchers and packing-house proprietors were called next. Examination of such representatives of those trades as appeared elicited the fact that a large amount of organic matter finds its way into the rivers from places where animals are slaughtered. Brewers, distillers, tanners, and the superintendent of the gas-works were called in the third place. Their *opinions* indicated that no harm comes to the rivers from their establishments. The facts elicited showed that organic refuse from distilleries, breweries, tanneries, the gas-works, and other places of the kind, adds essentially to the foulness of the rivers. The testimony of the experienced licensed scavengers and the plumbers,

and the records of the health office, proved that about one-third of the privy vaults in the city are connected with the public sewers, wherever the sewers extend, and that the washing out of the accumulated contents of such vaults, during the summer months, through the sewers into the rivers, is the most important source of the great nuisance. A large number of leading physicians testified that the stinking rivers are at least not conducive to health, and that the outflow of sewage into the lake endangers the water supply. A considerable number of resident engineers, some of them professional gentlemen with a national reputation, attended the final meeting. Their views as to a remedy for the evil were decidedly conflicting.

More than fifty witnesses were examined and their testimony was taken down verbatim by a skilled stenographer. Reporters of the press attended and gave the substance of the testimony to the public through the daily journals of the city. Citizens who responded to the call of the Commissioner of Health and contributed their especial knowledge and experience towards a solution of the difficult problem, are entitled to thanks. Their testimony is preserved in the complete notes of the stenographer for future reference and use. Facts gained in this investigation were of especial value in the preparation of the preceding minority report, and of another report which will appear further on.

Chemical examination of the drinking water furnished by the city was made at the request of the City Engineer and the Commissioner of Health. Professor Gustavus Bode, the well-known chemist of Milwaukee, attended the investigation as a witness and contributed the following

ANALYSIS:

OFFICE OF GUSTAVUS BODE,
MANUFACTURING AND ANALYTICAL CHEMIST, 11 Spring St. }
MILWAUKEE, WIS., August 21, 1879.

Dr. O. W. Wight, Health Commissioner of the City of Milwaukee:

Herewith please find copy of my report, giving the results of some chemical tests made of our lake water. Your instructions

were to ascertain whether the water was contaminated with the products of the decomposition of sewage, and if found so to test the quantity of deleterious matter contained therein. The water, experimented upon, was drawn as you directed, from the hydrant in my store, No. 11 Grand avenue, at three o'clock, August 1st. The wind was then and had been during the day southeast. One of the products of the decomposition of sewage is nitrous acid; another, ammonia. Neither of them, free or combined, is poisonous in the diluted form, in which they occur, but their formation is proof of a dangerous decomposition of sewage, and their quantity enables chemists to judge of the state of decomposition and of the quality of the water. Soluble organic combinations containing nitrogen (albuminoids) are another constituent part of the sewage. Their quantity is ascertained by forming ammonia out of the nitrogen,

My experiments have been made with a view to detect those substances and to find the quantity in which they are contained in the water. I have used the newest and most approved methods and feel confident that the results obtained are correct.

The water collected August 1st, contains no ammonia, but I found small quantities of nitrous acid and albuminoids.

Calculated for one gallon U. S. measure it contains nitrous acid, 0.1111 grains equivalent to 0.0338 grain nitrogen; ammonia, out of albuminoids 0.0585 grain equivalent to 0.0482 nitrogen. I have also tested water drawn from the same hydrant on August 17th. One gallon U. S. measure contained 0.0484 grain of nitrous acid equivalent to 0.0145 grain of nitrogen, no ammonia and a quantity of albuminoids too small for testing. The wind was on August 17th, and had been for several days, north and northeast, and we were favored with copious rains during the previous week, which will explain the large decrease.

My analysis proves, that our lake water contains the products of the decomposition of sewage, but not to any alarming extent. Warm and dry weather are favorable to the process of decomposition, and under such conditions and with prevailing southeast

winds the contamination of the water may increase to be dangerous to health. Respectfully yours,

GUSTAVUS BODE,

Analytical Chemist.

MICROSCOPICAL EXAMINATION.

Dr. R. U. Piper, of Chicago, justly distinguished as a skilled and experienced microscopist, attended the investigation, as a personal friend of the Commissioner of Health, without charge to the city. He remained several days and examined specimens of water taken from a dozen points in the rivers. He also examined specimens of water taken from the hydrant in my house, from the reservoir, and from the mouth of the inlet-pipe in the lake. Specimens of water taken at various depths some distance from the shore, beyond any possible contamination by sewage, were also examined. The same living organisms, both animal and vegetable, found in the river water, were also found in all the specimens of water taken from the public supply. These organisms were not found in the specimens of water taken from the lake beyond the influence of pollution from the drainage of the city. These two facts taken in connection show that the water supply of Milwaukee is contaminated by the town sewage. The analysis of the chemist corroborates the examination of the microscopist. It is impossible to determine how much, or how little, danger arises from such contamination. It is unpleasant to be obliged to believe that with the water from our costly supply we are drinking even a very minute quantity of our own excreta.

Add to this the important pathological fact that the various diseases of human beings are mainly eliminated by the excretions, and that the seeds of such diseases, too minute to be seen by the microscope and recognized by the processes of chemistry, are mingled with the sewage polluting drinking water, and the subject becomes decidedly unpleasant to contemplate. We may be comparatively safe at present, but should some epidemic of enteric disease strike Milwaukee we know not how soon its peaceful homes might be turned into abodes of mourning. As John Simon says,

"Chemical demonstration of unstable, nitrogenous compounds in water is a warning which of course should never be disregarded; but till chemistry shall have learnt to identify the morbidic ferments themselves, its competence to declare them absent in any given case must evidently be judged incomplete, and waters which chemical analysis would probably not condemn may certainly be carrying in them very fatal seeds of infection."

Thanks are publicly due to Dr. Piper for his interest and gratuitous services in this matter.

FURTHER DEMAND OF THE COUNCIL.

Alderman Anstedt, Chairman of the Committee on Health, introduced, at the regular meeting of the Council, on the first of September, 1879, the following resolution:

Resolved, By the Common Council, that the Commissioner of Health be and he is hereby instructed to report to the Council at its next session a plan for removing from the city all foul matters without allowing the same to enter the sewers, and the cost thereof.

On motion the rules were suspended and the resolution was adopted.

In response to the resolution, the Commissioner of Health submitted to the Council, at its regular meeting on the eighth of September, 1879, the following

REPORT:

To the Honorable the Common Council:

The foul matters that enter the rivers, either directly or through sewers, come from water closets, urinals, privies, kitchens, stables, slaughtering places, the gas works, breweries, tanneries, distilleries, dirty streets and various factories. These matters, if left where they are produced, accumulate, putrefy, and create intolerable nuisances. The problem which the Council has given me to solve

1. I must warn citizens not to jump out of the frying-pan into the fire, by abandoning lake water and resorting to wells and cisterns, the waters of which, as I have many times shown, are very dangerously polluted.

is: How to get rid of such matters without causing other nuisances on the way? Any wise solution of the problem must look to the future as well as the present; must be good for a population of three hundred thousand as well as for a population of one hundred and twenty thousand. I propose to follow the crucial method of elimination, which is the severest test to which any plan can be subjected, for it enables any man of common sense to examine each step and observe every stumbling block in the way.

Bear in mind at the outset one just principle, which is that any business must take care of its own refuse at its own expense, while what is common to the whole people can best be taken care of at the public expense.

1. The proprietors of factories for making soap, starch, candles, chemicals, woolens, etc., are not now permitted to put any solid refuse into the sewers. They can put into the sewers liquid refuse. They can and do put both into the rivers. Require them by strict ordinance to cart away from the city all solid refuse containing organic matter, and to run all liquid refuse containing organic matter through an ample filter-bed of fine gravel and sand before allowing it to flow either into the sewers or rivers. Everthing that will putrefy can thus be taken out. Such a filter-bed is very cheap, and can be renewed as often as it gets foul. In this way an important source of impurity to the rivers can be cut off, without depriving any one of a single right, and with exact justice to the community as a whole.

2. Half a dozen great tanneries stand on the banks of the rivers in this city. The business may be healthy, but that is not the question under discussion here. Albumenoid substance, grease and other putrescible matters, escape from them into the rivers. It is not necessary to settle here the amount of such matters. The simple remedy is the same as for other factories. Require tanners by strict ordinance to put no solid refuse in the rivers and to run all their liquid waste through a large filter-bed. The tanneries being situated on the rivers, the filter-beds could be very cheaply renewed

by boat from the convenient clean sand and gravel on the lake beach. If the amount of organic matter is small, as the tanners claim, then the filter-beds would have to be renewed only at long intervals; if it is large, as some suppose, then the tanners are bound in duty to the public to renew the filter-beds sufficiently often.

3. Breweries should be dealt with precisely as tanneries. Every waste pipe should run to an ample filter-bed. If there is but little organic matter in the liquid refuse, the filter-beds will last a long time. On the contrary, if there is much organic waste, then the breweries of right ought to renew them frequently.

4. The proprietors of packing houses and slaughtering places must be required to remove all blood, manure, contents of paunches and guts, and offal from their premises to the country, and to run all water used for washing their places through filter-beds before allowing it to flow into the sewers or the rivers. The offal of slaughtered animals is sufficiently valuable to pay for the cost of removal.

5. Distillers must do the same; except when they are feeding cattle they will be required, in regard to that part of their business, to follow another rule which will appear farther on.

6. The gas works should not be allowed to put any waste, either solid or liquid, into the sewers or rivers. When the "scrubbers," "purifiers," etc., are cleaned out, there is a very strong odor, extremely penetrating, and liable to spread to a great distance. An act of Parliament provides that "Any person engaged in the manufacture of gas who causes or suffers to be brought or to flow in any stream, reservoir, aqueduct, pond or place for water, or into any drain communicating therewith, any washing or other substance produced in making or supplying gas, shall forfeit for every such offense the sum of two hundred pounds."

7. An important source of the filth that finds its way to the rivers is from animals—horses, mules, cows, etc. The proper method of getting rid of the excreta of animals is very simple and involves really no expense to citizens who own them. Farmers in

the neighborhood of the city are already paying the livery stable men something for the privilege of hauling away the manure. When the farmers learn that the urine of the same number of animals is worth six times more for manure than the dung, they will be anxious to get the whole of the fertilizing material. A surprisingly small bulk of chaff, saw-dust, or even dry sand will absorb a large quantity of urine. Require the owners of animals to lay hard wood (maple is best) floors, well calked, in their stables, and to use absorbing material enough to keep the same dry without running any putrefying waste into the rivers. Allow nothing to be thrown out of doors to steep in the rain and become a source of pollution. Farmers will soon learn to bring chaff and straw to absorb the valuable fertilizer and take all away to fatten their land. An ordinance requiring all this will teach and benefit individuals, while protecting the public. Distillers, fattening cattle, must conform to this regulation, and the same provision should apply to stockyards.

8. Kitchen slops and wash water are a large source of sewage in every city. Wherever there is sewer connection with houses, these liquids should be run through a filter. A very cheap and effective filter may be made by filling a kerosene barrel one-fourth full of coarse gravel, then one-fourth full of fine gravel, and then one-fourth full of fine beach sand. It will last a long time and can be cheaply renewed when fouled. Only through the intermediary of such a filter should wash water and kitchen slops be allowed to enter the sewers, to find their way to the rivers. Sewer connection and the filter should be required, unless the citizen has a lot sufficiently large to scatter these liquids safely over the grounds. Of course the garbage should be cared for, to be removed as hereinafter provided.

9. Privy vaults are the worst and most dangerous nuisance in the city. The accumulated putrid contents of vaults washed out through the sewers into the rivers, have contributed the most concentrated and foul element to the great, open, three-branched cesspool of Milwaukee. Beginning at the center of the town and working toward the circumference, let these perilous receptacles of human ordure be cleaned out and then be filled up with unpolluted

earth. The privy house can remain. Under each hole in the seat let a strong pan of galvanized iron be placed. Thus far at the citizen's expense; only let the maximum charge for cleaning (now allowed by ordinance), be reduced from two and a half to two dollars per cubic yard. Direct the householder to husband the ashes from his fires and use them to keep the contents of the pans aforesaid dry, and consequently free from smell. Then let the city organize a system of removal to be done three times weekly. A good laboring man and a boy, with a dump cart and strong horse, can empty the ash-dried contents from the pans of one hundred privies in a day, and at the same time take the garbage from each habitation. As there are about fifteen thousand places to be visited every other day, the removal would require seventy-five carts. Man, boy, cart and horse, I find by diligent inquiry, can be hired for three dollars a day. Including efficient superintendence, the cost of removal will therefore be seventy-five thousand dollars a year. For obvious reasons, removal could not be left to individual citizens. The contract system would have grave defects. The city should do the work, at the public expense, only it should hire and not own the carts. A scavenging department, well organized, properly disciplined, in the hands of a capable superintendent to be appointed by the Mayor and confirmed by the Council, would unquestionably be successful.

The material, I know from experience with the scavengers of my department, will be gladly received by farmers and gardeners in the vicinity, from the first. Ere long it will command a price, lessening more and more the cost of removal. Compare the cost with that of intercepting sewers: A complete system of intercepting sewers, aggregating more than twenty miles, with tunnels under two rivers, with works to pump from lower to higher levels, will cost not less than a million and a half. Interest, including repairs, wear and tear, is reckoned low at ten per cent. That makes \$150,000 a year. Add to this \$25,000 a year for expenses of running pumping engines. Add \$50,000 a year as interest on the cost of removing the water works to Whitefish Bay, necessitated by the intercepting sewer system. The total is \$225,000 a year,

as against \$75,000 a year for the dry removal system. And with the latter system citizens are perpetually rid of the cost and trouble of removal. Besides, the sum of \$75,000 a year for dry removal would be paid to laboring men in our midst, while the annual cost in the other case would go as interest money to capitalists. Dry removal enriches farms and gardens in the neighborhood, helping to create business and benefitting the laboring classes. The dry removal system abates the great back-house nuisance, adding healthfulness to every man's habitation, while the other and far more costly system leaves it untouched. The one system sends our filth nearer our drinking water. The other sends it to enrich the earth from which we live. To say that we cannot organize an efficient and successful public service for removing the organic wastes of a city to the land, where it belongs, is to acknowledge that we are not industrious and enlightened enough to clean up our own filth; is to confess that municipal self-government is a failure.

10. To complete the system of dry removal, the main streets must be cleaned every day, when they are not covered with ice and snow, and the gathered filth be carted for manure to the land.

11. The water-closets and urinals alone remain to be considered. There are exactly 3,342 water-closets in the city; of urinals there are less than 100. Water-closets are used by about 15,000 people. They are the source of a very considerable amount of sewage of the most offensive kind. If they are left to run their contents through the sewers into the rivers, the great nuisance under consideration will not be wholly abated. Yet the wealthy and luxurious classes who have such "modern improvements" will not give them up without a conflict. The possessors of such household conveniences have influence enough to defeat any system of removal that shall deprive them of their "comforts." If they would only adopt earth closets, or do as seven-eighths of the people do, the problem would already be solved in the interest of a comprehensive economy and of sanitary science.

I propose to leave this odorous luxury to the rich, but to make them pay for it. Shall we, then, for a money consideration allow the rivers to be still polluted to a certain extent? By no means! The cleanliness and virtue of our fair city are not for sale. I would tax water-closets, to defray the expense of flushing the rivers, made necessary by leaving this one source of filth to enter them. It is not just to make the citizens at large pay for removing the nuisance which one-eighth of the population persist in making. Let those who insist on retaining the sewer-gas-creating convenience in their habitations defray the expense thereby imposed upon the city.

This brings me finally to the question of flushing, which I shall consider only in briefest outline. I have already shown how four-fifths of the putrefactive matter which now enters the rivers and infects them can be effectively and economically removed from the city. Of course, if only one-fourth of the filth remained in the rivers, the difficulty of flushing them would be reduced by three-fourths.

I have a new scheme of flushing, not hitherto proposed, which I give for what it is worth. If you wish to move a rope, it is much easier to pull it from the end than to push it from the end. I propose to pull foul water out of the rivers, instead of attempting to push it out. Construct, in the necessary foundation for an engine an ample pumping well, on the north end of the low sand island below the Cut-Off. From this well, lay an iron pipe four feet in diameter along the east side of the Milwaukee river as far as Oneida street bridge. After crossing over from the pumping-well in a dredged bed let it follow the docks on the bottom, so as to be out of the way of shipping. Extend another like pipe from the pumping well along the Menomonee to the region of the packing houses. Run still a third pipe along the Kinnickinnic five-eighths of a mile. The three pipes should have separate gates at the well. All the pipes should be provided with shut-off valves and inlets at different points in their course, say at the entrance of each sewer. Two hundred million gallons of dirty water can be pumped daily from the rivers through these huge pipes. By means of the different

stops and inlets the water can be taken up at any point along the rivers which may be selected.¹

What shall be done with the dirty water thus pumped from all over the tri-furcated bayou? A wide canal can be made, for a very small expense, running southward half a mile from the pumping well, with a descent of two feet to the mile. The soiled water would thus be filtered through twenty acres of beach sand and gravel. Any overflow would reach the lake a long way from the Cut Off, to be swept onward by the southward current of the shore. Pumping could cease when a southeast wind blows. Of necessity, if 200,000,000 gallons of dirty water were pumped out, just so much clean water from the lake would come in to take its place. Thus the 1,200,000,000 gallons of dead water in the three rivers could be changed in six days. But what will this cost? I have made figures with the best practical men in the city, who are familiar with each detail of such work. The calculations have been made for lifting the water about seven feet above the surface of the river. The maximum expense of everything would be \$500,000. Interest at ten per cent. (including repairs and replacements) on this sum would be \$50,000 a year. The cost of running the works, for a hundred days a year, would be \$10,000. It would, therefore, be necessary to provide for an annual expenditure of \$60,000. A tax of twenty dollars each on 3,000 water-closets—342 less than are now in use—would exactly produce that sum.

1. Instead of these iron pipes, tight conduits might be constructed of oak planks laid double and crossing each other. Such conduits might be placed behind the piling, under the edge of the wharves on each side of all the rivers. They might be sunk just below the freezing point in the water. If well made, they would be tight enough for practical purposes; in fact, they would need to be supplied with gates to let water into them from the rivers. These conduits could also be used as intercepting sewers, by conducting into them all the sewage from the sewer system of the town. They would also be so located that all the liquid refuse from packing-houses and manufacturing establishments along the rivers could be drained into them. Conduits of sound oak sunk in the water, would last longer than thin iron pipes. Thus all sewage could be pumped out of the city, and with it a vast volume of stagnant river water, every day. In this way the cost could be reduced nearly one-half.

This plan of flushing the rivers may be very effective, as it certainly is very comprehensive; but it is very costly. Besides, being based on a water-closet tax, it has a grave element of injustice in it. The wards bordering on the Milwaukee river have 2,990 water-closets, while all the rest of the city has but 352. It would not be right to make citizens in these wards pay for flushing in regions of the city where there are only a few "modern conveniences."

The difficulty can be met in a far more economic way, and with exact justice. The Council and the public are already familiar with the plan of making a tunnel from the Lake to the Milwaukee River below the dam, and pumping in water for flushing. This plan has been objected to as one-sided. As a remedy for the *whole* of the existing evil it would be decidedly partial. In a scheme of dry removal, as a remedy for the sole-remaining source of pollution from water-closets, it would be exceedingly fair. As about seven-eighths of all the water-closets in the city are emptied through the sewers into the Milwaukee River, it would be necessary that that stream should receive seven-eighths of the flushing. Let the city take possession of the dam and the water-power, and also make the tunnel. Instead of purchasing an engine, let the pumping be done by the water-power. The water from the dam used for pumping, and the water thereby pumped from the lake would together do the work of flushing. One gallon falling twelve feet from the dam would lift two gallons five feet from the lake, besides overcoming friction. As there is a daily flow of 50,000,000 gallons, during the dry season, in the Milwaukee River, it follows that this flow, applied to machinery, would pump 100,000,000 gallons more from the lake. The amount could be temporarily doubled by drawing from the dam a little and doubling the flow.

The cost of the works, without a pumping engine would be about \$140,000. The interest on this sum at ten per cent. is \$14,000 a year. There are just about 2,800 water-closets that are tributary to the Milwaukee River. A yearly tax of five dollars on these would just meet the outlay necessitated by their existence. A yearly tax of five dollars on the 342 water-closets which empty

into the Menominee and Kininickinnic would produce \$2,710 per annum. That sum would be the interest at ten per cent. on \$27,100. For this amount a dozen artesian wells could be sunk which would flush these rivers enough to compensate for the small amount of pollution coming from such a limited number of water-closets.

The only drawback to this simpler and cheaper plan is that it would endanger our drinking water more than the costly and effective plan first described. The danger, however, would be very small. Neither plan would be sufficient, except as a supplement and completion of a dry removal system. No artificial flushing within our means can purify the vast volume of dead water in the rivers, if we continue to make it the receptacle of the whole filth of the city.

Thus, gentlemen of the Common Council, I have complied with your instruction to report to you a plan for removing from the city all foul matters without allowing the same to enter the sewers, and the cost thereof. The plan would be virtually self-sustaining, would give employment to labor, and would enrich the country around the city. The dry removal system would relieve citizens of private burdens to an aggregate amount equal to the small additional taxation required for its safe and efficient administration, and the river nuisance would be thereby abated, together with several other nuisances dangerous to the public health. The system could be indefinitely expanded with the growth of the city. The experience of Europe demonstrates that the plan is not an experiment but a practically attainable reality. Respectfully submitted,

O. W. WIGHT, M. D.,
Commissioner of Health.

THE COUNCIL MULTIPLIES ITS DEMANDS.

At the same regular meeting, Alderman Gallun introduced the following resolution:

Resolved, By the Common Council, that the City Attorney and the Chairman of the Judiciary Committee be and they are hereby instructed to prepare, before the next meeting of the Council, ordinances embodying the

recommendations of the Commissioner of Health in regard to the disposal of the solid and liquid refuse of various factories and trades, of tanneries, breweries, distilleries, gas works, stables, stock yards, slaughtering places, packing houses, and other establishments producing organic waste; and also in regard to the cleaning and filling of privy vaults, and the establishment and regulation of a public service for the removal of night soil, street sweepings, garbage and other filth from the city.

On motion the rules were suspended and the resolution was adopted.

The Commissioner of Health drew the ordinances required by the resolution, which were merely looked over by the City Attorney and Chairman of the Judiciary Committee. The proposed ordinances are here given, with such explanatory notes and comentaries as further light on the various subjects seems to require.

I. AN ORDINANCE

In relation to the keeping of horses and other animals in the City of Milwaukee.

The Mayor and Common Council of the City of Milwaukee, do ordain as follows:

SECTION 1. Every stable, barn, pen, shed, yard or other place where horses, asses, mules, cattle, sheep, swine, or other such like animals are kept, is hereby required to be provided and kept provided with water tight floors, or floors of dry earth, and sufficient straw, chaff, sawdust or other absorbent material shall be used to absorb all the urine produced by such animals; and the dung and the urine absorbed as aforesaid, produced by such animals, is hereby required to be kept, while the same shall remain in the City of Milwaukee, in some dry place under cover, and to be removed from the city at least once a week.

SEC. 2. Every proprietor, lessee, agent or other person having charge of any such stable, barn, pen, shed, yard or other place where any such animals are kept, who shall fail to observe any of the requirements of the preceding section shall upon conviction

thereof, be punished by a fine of not less than ten, nor more than fifty dollars for each such offence, and every day that he shall so fail after conviction as aforesaid shall constitute a new offence.

SEC. 3. All ordinances, parts of ordinances and resolutions contravening any of the provisions of this ordinance, in so far as they conflict herewith are hereby repealed.

SEC. 4. This ordinance shall take effect and be in force from and after the expiration of thirty days after the passage and publication of this ordinance.¹

II. AN ORDINANCE

In relation to the disposal of organic refuse and liquids from manufacturing establishments and places of business in the City of Milwaukee.

The Mayor and Common Council of the City of Milwaukee do ordain as follows:

SECTION 1. All proprietors, managers, superintendents, and employes of tanneries, breweries, distilleries, dye houses, soap boiling works, commission houses, and all other manufacturing establishments and places of business of any kind whatsoever in the City of Milwaukee, where there is waste or refuse containing organic matter, are hereby required to remove from said city all such waste or refuse by them produced, that is not liquid, three times every week, and are hereby prohibited from putting the same or causing or allowing the same to be put into any sewer or river, canal, bayou, or water course in said city, or in the lake adjacent thereto.

1. As here given, the words "or floors of dry earth" have been inserted at the proper place in the first section. With this amendment, no one would be prevented from keeping a horse in a box-stall, and the proprietors of open cattle-yards would not be obliged to floor-over the same. As thus amended, the ordinance ought to pass. Its enforcement would essentially add to the cleanliness and wholesomeness of the city. It would impose hardship upon no citizen.

SEC. 2. All proprietors, superintendents, managers and employes of such manufacturing establishments and places of business as aforesaid, are hereby prohibited from running, emptying or conveying, or allowing to be run, emptied or conveyed into any sewer, river, canal, bayou, or water course in said city, or into the lake adjacent to said city, any liquid waste or refuse by them produced until such waste or refuse has been passed through an ample cleansing filter to be approved in writing by the Commissioner of Health of Milwaukee, which filter shall be renewed as often as said Commissioner shall deem necessary.¹

SEC. 3. Any person violating any provision of this ordinance shall on conviction thereof be fined not less than twenty-five dollars nor more than \$100.

SEC. 4. All ordinances, parts of ordinances and resolutions contravening the provisions of this ordinance in so far as they conflict herewith, are hereby repealed.

SEC. 5. This ordinance shall take effect and be in force from and after its passage and publication.

III. AN ORDINANCE

In relation to privies, privy-vaults and water-closets in the City of Milwaukee, and in relation to the removal of night soil, garbage and other filth from said city.

The Mayor and Common Council of the City of Milwaukee do ordain as follows:

SECTION 1. All persons are hereby prohibited from making or maintaining any connection between any privy, privy-vault, water-

1. The provisions of this section would, in many cases, be impracticable. The amount of organic matter in the liquid waste would frequently be so great as to require a new filter-bed every day. Some kind of a sewer should be supplied by the city to carry off such liquid waste, without allowing it to flow into an open river. The prosperity of the city depends in a great measure upon its manufactures. It cannot afford to drive them away, on account of its own delinquency in providing a faulty sewer system. With a material modification of this section, the ordinance ought to pass.

closet or urinal, and any sewer in the City of Milwaukee, unless means are provided and employed for the abundant flushing of the same with clean water every time it is used.

SEC. 2. All persons are hereby prohibited from running, draining or in any way conveying or causing to be conveyed the accumulated contents of any privy, or privy-vault, into any sewer in the City of Milwaukee.

SEC. 3. All persons are hereby prohibited from burying or causing to be buried in the ground in the City of Milwaukee the contents of any privy-vault or vaults, or any accumulation of night soil.

SEC. 4. Any owner, agent or occupant of a water-closet or privy connected with any sewer in the City of Milwaukee and provided with means of flushing as aforesaid, shall pay a special tax to said city of five dollars per annum for each such water-closet or privy.

SEC. 5. All moneys accruing from the tax provided in the previous section shall be set aside as a special fund to be used exclusively, under the direction of the Common Council of the City of Milwaukee, for flushing or otherwise cleaning or purifying the rivers in said city.

SEC. 6. It shall be the duty of the Commissioner of Health of the City of Milwaukee forthwith to order the cleaning of all foul privy-vaults in said city, and the filling the same with fresh earth, beginning in the central part of the city and working towards the circumference. The cleaning of the same shall be done in the manner provided by an ordinance entitled, "An ordinance concerning scavengers," passed October 29, 1877; except the maximum price that may be demanded by scavengers for such cleaning shall be two dollars instead of two and a half dollars per cubic yard of matter removed.

SEC. 7. Immediately after privy-vaults shall be cleaned and filled as aforesaid, the owners, agents or occupants thereof shall procure galvanized iron pans of such dimensions and form as the

Commissioner of Health shall direct, and place one such pan under each hole in the seat of the privy house on his premises, and the privy house shall be so located and constructed that said pans shall be easy of access and may be quickly removed for cleaning and conveniently returned.

SEC. 8. Owners, agents or occupants of privy houses so arranged as provided in the previous section shall keep the pans, when the same are in use, dry by means of ashes, earth or some other absorbing substance, and shall not put nor cause to be put nor allow to be put therein any house slops or other liquid refuse.

SEC. 9. The contents of the pans aforesaid, together with garbage, offal, ashes and dead animals, shall be removed three times each week at the expense of the City of Milwaukee, the same shall be disposed of to the best advantage of the city, and shall be taken beyond the city limits, except when any portion thereof may be delivered, without making any nuisance, to gardeners and others for manure in the uninhabited districts of the city.

SEC. 10. It shall be the duty of the Commissioner of Health to make necessary rules and regulations for the details of removing night soil, garbage, offal, ashes and dead animals as provided in the previous section, which rules and regulations shall be subject to the approval of the Common Council, and when thus approved shall have the same force as other provisions of this ordinance.

SEC. 11. It shall be the duty of the Commissioner of Health to employ the necessary labor and teams for the removal aforesaid, but all such employment shall be by the day and subject to the approval of the Common Council. And the said Commissioner shall make weekly reports to the Council in writing, giving the number of laborers, and teams thus employed, and the cost thereof; also giving the amount of material removed, where removed to, and from what number of houses. It shall also be the duty of the Commissioner of Health to appoint, subject to confirmation by the Common Council, a sufficient number of superintendents to see that the persons thus employed, shall do their duty and earn their wages.

SEC. 12. All persons employed as aforesaid shall be paid in the same manner as other employes of the city.

SEC. 13. Owners, agents or occupants of premises whereon privy houses are maintained as aforesaid shall preserve dry and use ashes made on their premises for the purpose of keeping privy pans, hereinbefore described, inoffensive and easy of cleaning without nuisance. Ashes on all premises where such privy houses are not used shall be put in a portable vessel at a convenient place on the premises and be removed three times a week in the same manner as herein provided for the removal of night soil, garbage, etc.

SEC. 14. All persons employed as herein provided shall be civil with the people, and shall report to the Health Department any nuisances they may find.

SEC. 15. Any person violating any provision of this ordinance shall on conviction thereof be fined not less than five dollars nor more than \$100.

SEC. 16. All ordinances, parts of ordinances, and resolutions contravening the provisions of this ordinance, in so far as they conflict herewith, are hereby repealed.

SEC. 17. This ordinance shall take effect and be in force from and after its passage and publication.¹

IV. AN ORDINANCE

In relation to slaughter houses and packing houses in the City of Milwaukee.

1. This ordinance is aimed at the greatest nuisance in the city—a nuisance far more dangerous to the public health than that of the stinking rivers. It will need modification in some of its details, according to the plan ultimately adopted and carried out for the disposal of sewage. The provision to tax water-closets for a special purpose, of course, will not be required, if that special purpose should not exist. And it might be found more economic to have the work done by contract; and perhaps quite as efficient, with proper superintendence. Whether some form of intercepting sewer is adopted or not, for relief to the rivers, the vile privy-vaults of the city ought to be done away with. Economy, decency, cleanliness, health, alike demand this important measure of sanitation.

The Mayor and Common Council of the City of Milwaukee do ordain as follows:

SECTION 1. The slaughtering of animals, except calves, lambs and sheep, by proprietors of retail meat markets for use in their own retail trade, in the City of Milwaukee at all seasons of the year, is hereby prohibited, except at such slaughter houses as are now, or may hereafter be established in the valley of the Menomonee river; and every person who shall slaughter or cause to be slaughtered, any animal, except calves, lambs and sheep as aforesaid, at any season of the year, at any place in the City of Milwaukee other than an established slaughter house in said valley, shall upon conviction thereof be punished by a fine of not less than fifty nor more than \$200.

SEC. 2. All proprietors, lessees, agents and managers of slaughter houses, packing houses and places where slaughtering of calves, lambs and sheep is permitted, in the City of Milwaukee, are hereby prohibited from placing or putting any offal, blood or other unwholesome or offensive matter, the product of slaughtering, into any sewer, river, canal, bayou, or water course in said city, or into the lake adjacent thereto, or allowing the same to run, wash, drain or otherwise escape into such sewer, river, canal, bayou, water course, or lake; and they are hereby required to cause all such offal, blood and other unwholesome matter, the products of their several slaughtering places, to be deodorized and disinfected as soon as may be after the same shall have been produced, and to remove the same from the City of Milwaukee within twenty-four hours after the production thereof, and to run all water used for cleansing in their several slaughtering places through an ample filter-bed,¹ said bed to be approved in writing by the Commissioner of Health of Milwaukee, before the same is allowed to escape into any sewer,

1. It would be a pretty huge practical joke on the proprietors of the great packing houses to require them to carry out such an arrangement for filtering their liquid refuse. They should have a chance to dispose of it through a proper public sewer. With the omission of this feature, the ordinance is very much needed and ought to pass.

river, canal or bayou in said city, and every such proprietor, lessee, agent or manager who shall violate any of the provisions of this section shall, upon conviction thereof, be punished by a fine of not less than fifty nor more than \$200 for each such offence.

SEC. 3. Sections twenty-three and twenty-four of chapter twelve of an ordinance of the City of Milwaukee, entitled "An ordinance to revise, consolidate and amend the general ordinances of the City of Milwaukee," passed April 20, 1875, and all other ordinances, parts of ordinances and resolutions, contravening the provisions of this ordinance are hereby repealed.

SEC. 4. This ordinance shall take effect and be in force from and after its passage and publication.

V. AN ORDINANCE

In relation to Gas Works in the City of Milwaukee.

The Mayor and Common Council of the City of Milwaukee do ordain as follows:

SECTION 1. All proprietors, managers, superintendents and employes of any gas works in the City of Milwaukee are hereby prohibited from conveying, running or allowing to be conveyed or to be run into any sewer, or river, canal, bayou, or water course in said city, or into the lake adjacent to said city, any refuse either solid or liquid, or any washings, from the manufacture of gas.¹

SEC. 2. Any person violating the foregoing provision shall, on conviction thereof, be fined not less than twenty-five dollars nor more than \$100.

SEC. 3. All ordinances, parts of ordinances and resolutions contravening the provisions of this ordinance in so far as they conflict therewith are hereby repealed.

1. So far as liquid refuse is concerned, this ordinance is unnecessarily stringent. That it should not be run into the river, is quite certain. But what has been previously said about a sewer to carry such liquids away is applicable here also.

SEC. 4. This ordinance shall take effect and be in force on and after its passage and publication.

These ordinances were introduced into the Common Council by the President of that body and were referred to the Committees on Health and Judiciary, where they still slumber.

SANITARY CANONS.

A few questions of cleanliness, on which this whole matter of the river nuisance depends, may be regarded as settled canons in sanitation.

(1.) All waste, whether in solid or liquid form, containing organic matter must be removed from inhabited places before undergoing putrefactive change.

(2.) All such waste that is not liquid must be removed from towns, either large or small, by carting.

(3.) In large towns, liquid waste, *only* liquid, may be removed by water-carriage, or by means of sewers.

(4.) With liquid waste, containing organic matter in solution and suspension, or sewage proper, storm water and the water from land drainage should never be mixed.

(5.) Sewage should never be emptied into streams, or adjacent bodies of water, but should be pumped to prepared land in the neighborhood, and there utilized by irrigation.

(6.) In small towns, liquid waste can be safely disposed of without sewers, which are needlessly expensive.

(7.) In large towns, liquid waste *can* be removed without sewers, but sewers are cheaper. In small towns, liquid waste *can* be removed with sewers, but sewers are dearer. The practical question in each case is, at what point does relative cheapness or dearness begin?

(8.) Sewers, when required, should be so constructed and managed that their contents shall, under no circumstances, poison the earth, air or water of inhabited places, either inside or outside of buildings.

I propose to apply these sanitary canons to the solution of the important problem under discussion, taking into account the present and prospective size of the city, its topography, and the works already existing.

DRY REMOVAL.

It is possible for any city. Is it best for Milwaukee? I will explain how it can be carried out, and will endeavor to place in the strongest light the arguments put forth by its advocates in its favor.

1. In the city there are over 200 places where animals are slaughtered for food. The liquid animal waste, the contents of intestines, some of the blood, the washings of these places, find their way in great part into the sewers and are carried into the rivers. It is difficult to estimate the quantity. At least fifty tons of putrescible matters are added every day to the stinking river filth from this source alone. No village in this State allows slaughtering within its limits. Here, in cellars, sheds and back yards, butchering is done on almost every street of the city. A proper ordinance can prevent it. Such an ordinance has already been pronounced valid by the Supreme Court of the State. Meat markets are clean. The butchering end in the rear is unclean. Stop slaughtering in the city, and the rivers will be relieved of twenty or thirty thousand tons of foul matter per annum. The consequent rise of property in the neighborhood of two hundred slaughtering places would equal the cost of making fifteen miles of intercepting sewers. The relief to the rivers would be greater than the relief by flushing from a costly tunnel. The butchers themselves would be more benefitted than harmed.

2. The contents of old privy vaults are clandestinely run into the sewers to an alarming extent. I do not mean water-closets. The water-closet proper is furnished with means of copious flushing every time it is used. The privy vault has no means of flushing. Human excreta accumulate there in putrid masses, frequently amounting to many tons. More than a hundred tons were removed from one great vault in this city last year. A large number of

vaults have a six-inch pipe in the bottom running to the public sewer. No water being used, the pipe usually clogs up. The vault then fills. When, in hot weather, neighbors begin to complain and threaten to go to the health office, the proprietor turns on a hose in the night and washes several tons of the most concentrated, putrid and vile filth into the sewer, daubing it up, sometimes choaking it, always filling it with poisonous, diptheria-breeding gas. Of course, this stuff goes into the river. I have no doubt that the most potent, sickening and poisonous element of the stink from the river during the past summer came from this source. The Common Council should pass an ordinance prohibiting any connection between privies and the sewers, except where provisions are made for copious flushing every time they are used. That measure alone, properly enforced by the Health Department, would relieve the rivers more than any scheme of flushing.

Not long ago a citizen bitterly complained of the Health Officer, because he would not let him cut a trench from a huge old tenement-house vault to the sewer. The scavenger corps removed from that vault to the farming land beyond the city limits about fifty tons of night soil. Imagine such a quantity of rotten excrement run at one time into the river! Letting off the dam would not clean up after it.

3. The dung and urine of animals add greatly to the filth of the rivers. People still persist in making barn-yards of alleys and the back ends of their lots. The urine of horses is especially offensive when undergoing putrefactive change. One hundred horses will produce half a tun of urine in twenty-four hours. If there are 6,000 horses in the city this product is therefore thirty tons daily. The manure of horses is inoffensive till it becomes wet and ferments, when it is as bad as any other dung. An ordinance requiring all owners of horses and other animals to keep the manure under cover and dry, to use some proper material to absorb the urine, and to remove both from the city at least once a week, would relieve the rivers of a great volume of filth, and would materially add to the fatness of the land in the surrounding country.

4. The "stink-factories" and distillery stables on the Kinnickinnic, Menomonee and Milwaukee rivers, outside of the city, add greatly to the nuisance complained of. There are State statutes and city ordinances enough to reach this element of the evil. Let the press and public opinion sustain the District Attorney and the Commissioner of Health while applying existing remedies to this source of river pollution, and it can be eliminated.

5. The main element is the bodily filth of the people. In a city of 125,000 inhabitants it amounts to not less than 125 tons a day—over 40,000 tons a year. What can be done with it? By no means put it in the rivers. Tear the water-closet out of every house, say a large number of citizens. Put in its place a decent earth closet. Learn wisdom from Moses and the cat. The water-closet is usually a sewer-gas death-trap in the house. There is only one thing worse, and that is an infernal hole in the ground, called a privy-vault, in which people treasure up their poisonous excreta for years. Clean out all such holes in the city, fill them up with clean earth, put galvanized-iron boxes under the seats of the privy houses, and keep the contents of the boxes dry and harmless with the house ashes. Remove at the public expense to the hungry land outside the city the contents of the boxes and of the earth-closets, every day if you like, at least once a week. People will then wonder at their foul stupidity for having so long lived with, slept with, and breathed the vapor of their own excreta; for having drank, quite likely, its very essence in the water of their wells.

6. Kitchen slops and wash-water are very bad; a good deal worse than most people imagine; and must be disposed of safely. Green grass, fresh cut, when spread on the ground, will dry into nutritious hay. Pile it in a big heap and it will rot into offensive manure. Scatter slops over a few rods of earth and they will make the lawn brighter and the garden richer. Throw slops in a mass and they will make a nuisance almost as stinking and dangerous as a privy. Thus that sanitary problem may be solved. The rich can use a Rogers Field flush-tank with buried agricultural drain tile for the distribution of kitchen and laundry water. The grass roots

would drink up the nourishing liquid and the lawn would be greener and none the less sweet. The apparatus costs about fifty dollars. The poor could do the same with a watering-pot or pail. Fortunately, three-fourths of the habitations of Milwaukee have surrounding ground enough for such a disposal of slops. Those who will live where there is no access to the earth, should send their dirty linen to the public laundries (a great economy), and cart off their dishwater.

7. A system of safe removal of garbage has already been inaugurated and can be perfected in the future with reasonable liberality on the part of the city.

8. Streets should be cleaned frequently and the "sweepings" removed like stable manure, to the tilled land of the adjacent country.

9. Nothing remains but the liquid and other waste of manufacturing establishments. Let them pool their interests, it is said, and lay private drain pipes, leading to some safe place, but not into the rivers; let manufacturers, like other citizens, cart off the refuse which they make.

Do all these things and the rivers would soon run clear for the want of foul material. The drinking water pumped from the lake would be pure. The wells of the city would again become sweet. Fewer people would die. Sickness would diminish. The public health would be improved. The city would regain its natural attractions. Property as well as life would be increased in value. The cost of a tunnel to Whitefish Bay, and of intercepting sewers would be saved—not less than \$2,000,000.

Inertia, prejudice of habit and conflict of opinion, it is claimed, are alone in the way of such a reform.

THE OTHER SIDE OF THE QUESTION.

It is agreed by all that solid refuse should be removed to the surrounding country by cartage, and should not be thrown into the rivers. But it is said, we must have sewers for the disposal of liquid refuse. Many householders would not and hotel-keepers

could not dispense with water-closets. Wash water and kitchen slops can be run off through sewers, but citizens would never acquire the skill or take the pains to care for them on their own lots without making nuisance. The liquid waste of breweries, tanneries, packing houses and other manufacturing places, is so great that sewers are a necessity for its removal. To require manufacturers to construct their own sewers would result in driving them out of town. As the prosperity of the city depends in a great measure upon its manufacturing interests such a procedure would be suicidal.

APPLICATION OF SANITARY CANONS.

A just conclusion would seem to be that Milwaukee has attained such magnitude and its prospective growth is so certain that removal of liquid refuse by means of sewers is required by a comprehensive economy. The amount of liquid that becomes fouled by organic matter in a state of solution or suspension is measured almost exactly by the quantity of water supply. About 10,000,000 gallons of water are distributed every day from the reservoir. This amount of water, passing through habitations and factories, receives various wastes and must be safely removed. It cannot be carted away. It would make daily more than 40,000 loads of a ton each. There is open land enough about habitations in the city to disinfect most of it, but the process is bothersome and the people could not be forced to carry it out.

Another sanitary canon is that such liquid refuse should not be flowed into the rivers. As all our sewers now empty into the rivers, it is evident that some change must be made.

Still another sanitary canon is that the liquid refuse of houses and factories should not be mixed with storm water and the water of land drainage. As the rain-fall in this region is about thirty inches per annum, it follows that the storm water on each square mile of the city amounts to about 500,000,000 gallons a year. Ten square miles will soon be embraced in the sewer districts of the town. The whole amount of storm water will then be 5,000,000,000 gallons per annum. Our sewers are made to carry off sewage

proper and storm water together. It is, therefore, further evident that change must be made if the important sanitary canon under consideration is to be followed.

The sanitary canon that requires sewage to be removed to land remains to be applied. Sewage proper is a valuable fertilizer. Sewage mixed with a vast volume of water is almost worthless. The cost of removing the mixture is very great, and the supply is almost as variable as the clouds. Intercepting sewers might give us the sewage on all fair days, but in rainy weather we should be obliged to handle a great quantity of water, or allow it to overflow, mingled with more or less filth.

A NEW SYSTEM.

The application of these canons necessitates the conclusion that we should construct a new system of pipe sewers, to receive only sewage proper. The sewage, almost exactly equal to the water used, would be a measurable quantity, and small pipes would be sufficient for its carriage. It could then be collected at a suitable point and removed by pumping to land, without oppressive cost. The value of the material, while not enough to defray the expense of collecting and removal, would be enough to materially lessen the expense. The cost of laying, ready for use, about ninety miles (the present extent of our sewer system) of such pipe, would be about \$250,000. The estimate given me by practical men experienced in such matters, is founded upon the cost of the best American vitrified pipe. The Scotch pipe, which is better, would cost more.

The expense of pumping sewage alone and of its disposal in irrigation would, of course, be less than the expense of pumping the same material mixed with a considerable amount of storm water, and of the disposal thereof in the same manner. The cost of a separate system of pipe sewers would, in my judgment, be less than the expense of intercepting sewers. There is no question that the former would be vastly preferable to the latter from a sanitary point of view. Dr. Blyth, a sanitarian of great experience and high authority, says "the benefit of a separate system to the public

health is incalculable." If we were beginning anew, it might be worth while to estimate the additional cost of a separate system; but we are now in a strait, owing to errors of the past, where we must choose between the separate system and the completion of a defective system. As such completion will cost as much as the incalculably more beneficial separate system, it seems to me unwise to hesitate between the two.

OBJECTIONS ANSWERED.

It is said that the separate system would put citizens, who have the "modern conveniences" in their houses, to the expense and trouble of disconnecting their premises from the old sewers and of connecting them with the new sewers. This, however, is no real objection. In at least ninety-nine houses out of a hundred, the present connections are faulty and dangerous. A new system, necessitating a change, would be an "incalculable" sanitary gain. If the present system should remain, the sewer-connections of nearly all houses ought to be radically overhauled. The small expense is of little importance in comparison with the benefit of having a healthy dwelling. The water pipes would remain undisturbed. It would only be necessary to change the waste-pipes.

It is also objected that we cannot afford to loose the vast expenditure already made in the construction of sewers. This reminds one of the reasoning of the old lady who took a box of pills, because she had them in the house and could not afford to throw them away. The present sewers are needed to carry off storm water and for subsoil drainage. It is true that they are more expensive than would have been necessary for such a purpose, but we have them on hand and the immediate and imperative question is whether we shall complete a bad system and endure its defects or add a new and perfect system at the same or less cost.

OTHER EVILS CONNECTED WITH THE PRESENT SYSTEM.

Of immense importance in determining this question are certain defects in the present sewer system, besides the fact that

they discharge their contents directly into the rivers; which defects have not received sufficient attention and certainly portend mischief in the future.

1. 'The first defect may be indicated in the language of Dr. Alfred Carpenter.' "There is another danger which arises from sewers if they are not constructed of impervious materials; brick sewers are open to great objections when they pass through pervious soil in close proximity to houses. Unless they are very freely and efficiently ventilated, they contaminate the air of the subsoil of a town until it becomes a perfect hotbed of mischief. This is a frequent cause for the continuance of enthetic disease in districts in which the water-line rises and falls at distinct intervals. The way in which gases travel long distances underground is sometimes shown by the distance which coal-gas travels when a fracture has taken place in a gas main. Sewer-gases, which only form in badly constructed sewers, are just as penetrating. The products of decomposition find their way through the bricks into the soil, and then into the foundations of the houses." This mischief is going on over a large portion of the sewer districts of Milwaukee.

2. Another defect is that many miles of our sewers are so badly constructed that they are essentially sewers of deposit. "No smell," says Dr. Carpenter, "will ever arise from a properly constructed sewer, and if there be smell, it is conclusive proof that there is deposit either in that sewer or in some other in close communication with it, or in the soil around it."² No stagnation, either of air or of sewage, should be possible in any sewer." Very few of our sewers could stand this crucial sanitary test.³

3. Still another defect is that in many places, especially in house-connections, water pipes and sewers are laid in proximity. It

1. Address in Sanitary Science and Preventive Medicine, delivered at the Sanitary Institute of Great Britain, at Croydon, October 22d, 1879.

2 Dr. Carpenter means *putrefactive* smell, smell arising from foetid organic decomposition.

3. It is not meant that existing sewers in Milwaukee are worse than the average. I wish to be understood as saying that existing sewers are not so good as to make them an exception to a kind that is bad.

is a "great law of sanitary work," again says Dr. Carpenter, "for sewer and water services to be decidedly separated, so that no interchange of either liquid or gases should be possible. It was shown not long since, that just where a water-pipe passed over a sewer, there the pipe was defective, and as a consequence a serious epidemic arose. Sewage soon decomposes iron; and if water pipes be allowed to lie in sewers, and to occupy portions of cesspits on the roadside, or to be in communication at those points at which water is delivered into a house and slops and sewage removed, there can be no safety for the people. I am sometimes astonished when I hear men who put themselves forward as sanitary authorities utterly ignore this fundamental law."

4. There is still another defect that would be of very great importance if we should find it necessary to disregard the sanitary canon requiring the utilization of sewage. Liquid waste could not be carried from the numerous places where it is produced to the general outfall by the existing sewers, without undergoing putrefactive fermentation on the journey. There are places in them where sewage is ponded by sags and necessarily becomes putrescent in hot weather. Many sewers have been daubed and fouled by tons of accumulated night soil run into them. Some of them have become badly filled with matter adhering to their rough interior surfaces. The germs of zymotic diseases multiply in their foul contents and add to the public danger. Within them centres of putrefying ferments have been established acting like leaven on the new matter which they are perpetually receiving. Such poisonous sewage could not with sanitary propriety be emptied into the lake, to find its way perhaps to our drinking water. Smooth pipe sewers would carry all liquid refuse from the habitations and factories of the city to the outfall in three or four hours, before putrefaction could have time to begin its deadly work. The cold water of the lake would prevent putrefaction taking place at all. Organic matters in solution would be diffused and lost in the great inland sea. It is a well known fact in natural history that fishes will readily consume suspended matters, provided such matters have not become putrescent. Hence with a new system, the unputrified

sewage could be safely delivered into the lake, at a point on the shore a mile or two south of the Cut-Off. With the old system, it would be necessary to pump the dangerous sewage, loaded with disease germs and ferments, away to a large area of prepared land for disinfection; or in lieu of this it would be necessary to bring water to the city from Whitefish Bay. Either course would involve the additional outlay of half a million dollars.

It is scarcely necessary to add that the defects here pointed out are strong arguments in favor of constructing a new and perfect system, instead of supplementing the old and dangerous system with intercepting sewers. Sanitary science and economy both point in that direction.

Thus far I have discussed the subject in a historical way, as it has been developed and matured in my own mind, and in the mind of the public, during many months of thought, study and anxious consideration. Before seeing or knowing anything about the conclusions of the consulting engineers, I have reached, and give for what they are worth, the following

RECOMMENDATIONS.

I. As a make-shift and temporary arrangement, construct, just behind the piling under the docks, along both sides of all the rivers, wooden conduits, with an aggregate capacity of conveying 100,000,000 gallons of sewage and water per day. Connect these conduits with tunnels under the rivers and locate the effluent point to the south of the old harbor inlet, at least a mile and a half beyond the Cut-Off. Sink the conduits in the water low enough to be out of danger from freezing. Of course, pumping would be necessary to secure outfall and consequent flow. All the sewage from the existing sewers, except during the heaviest rainfall, could be conducted into these conduits by means of an arrangement not unlike the sloop-hopper. From ten to twenty million gallons of sewage, including all the liquid waste from factories along the rivers, together with eighty or ninety million gallons of river water, could be pumped through these conduits every day. The river water

could be let into the conduits by means of gates placed at intervals, so as to take it up at will where foulest. The costliest parts of the arrangement, the tunnels and the pumping works, could be utilized for a subsequent and permanent system. The submerged wooden conduits would last many years if required. They would be perfect intercepting sewers for the time. The eighty or ninety million gallons of river water removed through them every day would be replaced by cool, pure water from the lake. No system of flushing could be more equally distributed through all the rivers or be more effective. The plan would keep the rivers perfectly sweet, at all seasons, for many years to come. The whole cost would not be over \$250,000, of which \$150,000 would be for tunnels and pumping works, or in other words, for permanent improvements needed in any case. The danger to the water supply would be greatly lessened by emptying the sewage into the lake at double the distance from the inlet pipe.¹

II. I would recommend as a permanent cure for the sewer and river nuisance the construction of a new system as already described. With the make-shift arrangement in operation, the city could proceed slowly and surely, according to a thoroughly matured plan, in laying the pipes of a permanent sewer system. It would be wise to require all owners of property to make sewer connections in the most approved and safe manner, as the work slowly progressed. There would be plenty of time to consider the question of a sewage farm, if experience should demonstrate its necessity. There would also be plenty of time to consider deliberately and wisely any questions of change in the water supply.

III. A concurrent system of dry removal for relieving the city of all solid organic refuse should at the same time be carried

1. Transverse sewers of brick in the adjacent streets would be just as good for diverting sewage from the rivers, and would be permanent, but they could not be built low enough to receive water from the rivers and thus serve as the means of flushing. The water in the rivers will stink in hot weather for years to come, unless it is changed by some artificial process. In my judgement, the only feasible plan of flushing *all* the rivers is by pumping dirty water out to be replaced by clean water flowing in from the lake.

out. Night soil, offal, garbage, manure, street sweeping, etc., should be removed to land in the neighborhood of the city, with scrupulous care and frequently.

The conservation of existing values; the future prosperity of Milwaukee; the health and happiness of the people, require that this plan, or some other better plan, should be adopted and carried out. The annual loss from delay will be greater than the entire cost of making the city the cleanest and healthiest on the American continent, perhaps in the whole world.¹

1. Col. George E. Waring, in a paper on the Drainage and Sewerage of Cities, read before the American Public Health Association, at Nashville, in November last, says:

"The arguments in favor of the exclusion of storm water from the sewers proper, seem to me so conclusive, that I no longer hesitate to accept such separation as essential to the best sanitary sewerage.

"Sewers large enough to remove storm water, according to the usual formulas, are open to several serious objections."

"The larger the sewer the more difficult becomes the matter of ventilation.

"Cases are extremely rare where sewers of the storm water size are not, at least during the dry and hot season, sewers of deposit to such an extent as to have their air made most foul by the decomposition of their sediment.

"Where the question of final disposal has become important, the admixture of storm water with the sewage leads to the constant embarrassment of the system, whether the process be chemical or agricultural."

"In my judgment a perfect system of sanitary sewerage, for a small town or a large one, would be somewhat like the following:

"No sewer should be used of a smaller diameter than six inches, because (a) it will not be safe to adopt a smaller size than 4-inch for house drains, and the sewer must be large enough surely to remove whatever may be delivered by these; (b) because a smaller pipe than 6-inch would be less readily ventilated than is desirable; (c) and because it is not necessary to adopt a smaller radius than three inches to secure a cleansing of the channel by reasonably copious flushing

"No sewer should be more than six inches in diameter until it and its branches shall have accumulated a sufficient flow at the hour of greatest use to fill this size half full, because the use of a larger size would be wasteful, and because when a sufficient ventilating capacity is secured, as it is in the use of a

6-inch pipe, the ventilation becomes less complete as the size increases, leaving a larger volume of contained air to be moved by the friction of the current, or by extraneous influences, or to be acted upon by changes of temperature and volume of flow within the sewer.

"The size should be increased gradually, and only so rapidly as is made necessary by the filling of the sewer half full at the hour of greatest flow.

"Every point of the sewer should, by the use of gaskets or otherwise, be protected against the least intrusion of cement, which, in spite of the greatest care, creates a roughness which is liable to accumulate obstructions.

"The upper end of each branch sewer should be provided with a Field's flush tank of sufficient capacity to secure the thorough daily cleaning of so much of the conduit as from its limited flow is liable to deposit solid matter by the way.

"There should be sufficient manholes, covered by open grating, to admit air for ventilation. If the directions already given are adhered to, manholes will not be necessary for cleansing. The use of the flush tank will be a safeguard against deposit. With the system of ventilation about to be described, it would suffice to place the manholes at intervals of not less than 1,000 feet.

"For the complete ventilation of the sewers it should be made compulsory for every householder to make his connection without a trap, and to continue his soil pipe to a point above the roof of his house. That is, every house connection should furnish an uninterrupted ventilating channel four inches in diameter throughout its entire length. This is directly the reverse of the system of connection that should be adopted in the case of storm water and street-wash sewers. These are foul, and the volume of their contained air is too great to be thoroughly ventilated by such appliances. Their atmosphere contains too much of the impure gases to make it prudent to discharge it through house drains and soil pipes. With the system of small pipes now described, the flushing would be so constant and so complete, and the amount of ventilation furnished, as compared with the volume of air to be charged, would be so great that what is popularly known as sewer gas would never exist in any part of the public drains. Even the gases produced in the traps and pipes of the house itself would be amply rectified, diluted and removed by the constant movement of air through the latter.

"All house connections with the sewers should be through inlets pointing in the direction of the flow, and these inlets should be funnel-shaped, so that their flow may be delivered at the bottom of the sewer and so that they may withdraw the air from its crown—that is the vertical diameter of the inlet at its point of junction should be the same as the diameter of the sewer.

"All changes of direction should be on gradual curves, and as a matter of course, the fall from the head of each branch to the outlet should be continuous. Changes of grade within this limit, if considerable, should always be gradual.

"So far as circumstances will allow, the drains should be brought together, and they should finally discharge through one or two main outlets.

"The outlet, if water-locked, should have ample means for the admission of fresh air. If open, its mouth should be protected against the direct action of the wind.

"It will be seen that the system of sewerage here described is radically different from the usual practice. I believe that it is, in all essential particulars, much better adapted to the plan of sanitary drainage. It is cleaner, much more completely ventilated, and is exactly adapted to the work to be performed. It obviates the filthy accumulation of street manure in catch basins and sewers and it discharges all that is delivered to it at the point of ultimate outlet outside the town before decomposition can even begin. If the discharge is of domestic sewage only, its solid matter will be consumed by fishes if it is delivered into a water course, and its dissolved material will be taken up by aquatic vegetation.

"The limited quantity and the uniform volume of the sewage, together with the absence of dilution by rainfall, will make its disposal by agricultural or chemical processes easy and reliable.

"The cost of construction, as compared with that of the most restricted storm-water sewers, will be so small as to bring the improvement within the reach of the smaller communities.

"In other words, while the system is, in my judgment, the best for large cities, it is the only one that can be afforded in the case of small towns "

SUBJECTS BRIEFLY DISCUSSED.

WOODEN PAVEMENTS.—PHYSICIANS AND BURIAL PERMITS.—
SANITATION OF PUBLIC INSTITUTIONS. WAUKESHA INDUSTRIAL
SCHOOL FOR BOYS.—PUBLIC BATHS.—GARBAGE CONTRACT.—
DISINFECTANTS.—QUALIFICATIONS REQUIRED OF HEALTH OFFI-
CERS IN GREAT BRITAIN.—CONSULTING ENGINEERS.—PACKING
HOUSES.—DETAILED FINANCIAL STATEMENT.—SUMMARY OF
NUISANCES, ETC.

“The practice of religion is founded on cleanliness, which is one-half
the faith and the key of prayer.”—MOHAMMED.

“A lawyer, an engineer and a physician, each fairly skilled in his
profession, and associated as a sanitary board, are by no means
equivalent to one man who has had so much training in each of
these professions as to be well acquainted with that part of each
which has a bearing on hygiene.”—DR. JOHN S. BILLINGS.

I. WOODEN PAVEMENTS.

"It is well known," says Professor Wm. H. Brewer, of Yale College, "that all woods contain certain nitrogenous, organic compounds, known chemically under the general name of *albuminoids*, and that these substances are active in inducing and favoring rot. All chemical methods for the preservation of timber from decay look towards getting this nitrogenous portion into some less soluble condition, or into some combination less liable to chemical change. When green wood is well soaked in cold water, a considerable quantity of such albuminoid matter is dissolved out, remaining in solution in the water. This solution, even when very dilute, is extremely putrescible—more so, indeed, than any person would deem possible, until he had tried the experiment. The fact is as true of the hardest woods, as maple and locust, as it is of soft wood.

"To illustrate: if a few pieces of such green wood, say of locust (I cite this species because it is a hard and particularly durable wood), be carefully freed from bark, and all foreign dirt, and put into the purest cold water—even distilled water—and let stand at the ordinary temperature of our climate, or our rooms, if the temperature at times rises to, say, by day 60° or 70° Fahr., the water soon begins to become turbid or opalescent; this opalescence increases, in two to four days a thin pellicle forms on the surface, active putrefaction sets in, along with an abundant growth of the septic ferments, and the liquid soon becomes peculiarly and pungently stinking.

"Without any visible evolution of gas, the liquid becomes very offensive to the smell, even when very dilute. The odor naturally

varies with the kind of wood used, but in all cases I have tried, it is very rank, I think fully as much so as the same amount of *animal* matter in solution would produce. The intensity and rapidity of putrescence vary, of course, with the temperature, the kind of wood, the degree of concentration of the solution, and probably with the amount of tanin and other similar extractive matters contained in the original wood.

"As in the case of other putrefaction, what the gases are which produce the stinking exhalations, we are entirely ignorant. It is probable that they are organic compounds of simpler molecular constitution than the albuminoids which furnished the necessary elements; and it is also probable that, as in other smells, the absolute amount exhaled is very small compared with the results produced on the senses.

"If kept long enough, and of sufficient concentration, there is an abundant fungoid growth in the solution, and if kept in the light it grows darker in color, gradually becomes sour to the taste and smell, but continues offensive in odor for a long time, I know not how long, but in bottles partly filled, it certainly continues to smell bad for two years. Where the solution is kept in the dark, the odor seems more offensive than if the decay goes on in the light, but in this direction my experiments have not been nearly so numerous.

"In the free air and full sunlight, along with the putrescence, a white fungus growth begins on the surface of the wood, which rapidly becomes slimy. This forms much more abundantly on the ends of the grain of the wood than on either the radial or tangential sides. The fungus growth goes on, modified, of course, by the temperature and the degree of concentration, and it continues offensive for an unknown period, or until the decay has become complete.

"Heart-wood and sap-wood act essentially alike in this matter, the difference is one of degree rather than character."¹

1. From a paper read before the American Public Health Association, at Nashville, November 18, 1879.

On sanitary grounds I must earnestly protest against the use of wood for pavements in this city. Porous pine blocks, laid endwise, not only absorb water which dissolves out the albuminoid matter of the wood, giving rise to the deleterious solution mentioned by Professor Brewer, but also absorb an infusion of horse manure and a great quantity of horse urine dropped in the streets. The lower ends of the blocks, resting on boards, clay or sand, soon become covered with an abundant fungoid growth. Thoroughly saturated with albuminous extract and the excreta of animals in a liquid putrescible form, these block pavements undergo decomposition in the warm season and add to the unwholesomeness of the city. The streets, in fact, might as well be covered a foot deep with rotting barn-yard manure, so far as unwholesomeness is concerned.

Clean gravel makes a good road, at about one-quarter of the expense, and fulfills every sanitary requirement. It is very durable where no heavy teaming is required. The costly unsanitary wooden pavement soon wears out in streets where there is much traffic. Good Medina sandstone pavement is a little more expensive in the beginning, but is far cheaper in the end.

For the reasons stated by Professor Brewer, saw-dust, shavings, and other refuse wood, ought never to be used for filling. Such material not only rots and settles, but creates a nuisance by decomposition.

II. PHYSICIANS AND BURIAL PERMITS.

On the 20th day of May, 1879, I issued the following order:

Section 1436 of the Revised Statutes of Wisconsin, provides as follows:

"No person practicing physic or surgery, or both, shall have the right to collect in any action in any court, fees or compensation for the performance of any medical or surgical service, or to testify in a professional capacity as a physician or surgeon in any case, unless he shall have received a diploma from some incorporated medical society or college, or shall be a member of the State or some County Medical Society legally organized in the State."

This statute clearly defines who among those practicing physic and surgery in this State shall be regarded as legal physicians and surgeons. Any one practicing physic or surgery, or both, whom the courts are compelled to hold as incompetent to testify in a professional capacity, will from the date hereof be held by this Department as incompetent to give a legal death certificate. The law requires that such a certificate shall contain, among other things a statement of the cause of death. Such a statement necessitates a professional judgment or opinion, which, according to the statute, can be legally given only by a practitioner who "shall have received a diploma from some incorporated medical society or college, or shall be a member of the State or some county medical society legally organized in this State."

As a consequence, families in which death occurs under the treatment of such legally incompetent practitioners will be liable to a visitation of the coroner. Existing law gives the citizen a right to employ any layman, any quack, any pretender to medical or surgical

knowledge and skill, to treat himself and family, but existing law also makes it the duty of the sanitary authority to reject the mortuary returns of such layman, quack or pretender, and to subject, whenever expedient or necessary, the final results of his presumptuous work to an inquest wherein the coroner and his jury, enlightened by legally competent witnesses, can determine the cause of death.

Any person practicing physic or surgery, or both, without the qualifications required by the statute, will please take notice, that one who holds himself out as a physician or surgeon is regarded by the law as responsible for possessing the usual knowledge and skill of a real physician or surgeon; that consequently, such a person is not exempt from the penalties imposed by ordinances and legislative acts for failure to report to the proper sanitary officer cases of contagious disease and death occurring in his practice. Ignorance is not a legal defence when the responsibilities of knowledge are assumed. A pretender who kills a patient by administering a deadly dose of medicine or by undertaking to perform an improper surgical operation cannot shield himself in the criminal court with a plea that, being an uneducated practitioner, he did not therefore know any better. Neither could he claim irresponsibility for not reporting to the sanitary authority a case of contagious disease upon the grounds that he, in consequence of being an ignoramus, could not recognize the disease. Again, if he should give "anthosterus," "cather of the bowels," "scherletena," "lack of vitality," "daeth barne," "A beby boy died on the bornday," or "canker humer," as the cause of death, he could not demand that the Health Department should be compelled to receive his mortuary certificate upon the ground that he, being a morally criminal pretender and an unmitigated presumptuous dunce, was therefore too ignorant to make one more correct.

Recent legislation in Illinois has driven fourteen or fifteen hundred incompetent practitioners from that State, who have sought refuge elsewhere. Wisconsin has received her share of them. From that source there has been considerable accession to the numbers of self-styled "doctors" in this city; some of whom cannot

fill up a blank death-certificate without aid; some of whom can scarcely write their names. Mortuary statistics have long enough been vitiated by their uncertain returns.

The law makes no distinction between different schools of medicine. The Health Department of Milwaukee will follow the law in this regard and treat all physicians alike who can show title to a legal status.

O. W. WIGHT, M. D.,
Commissioner of Health.

This order gave some additional work to our good faithful coroner; exposed certain pretentious practitioners without diplomas; and drove several unmitigated quacks out of town. It is still fulfilling the purpose for which it was intended.

III. SANITATION OF PUBLIC INSTITUTIONS. WAUKESHA INDUSTRIAL SCHOOL FOR BOYS.

The following report has a permanent interest for the people under my immediate sanitary charge, for it describes conditions likely to occur in institutions which the people of Milwaukee are largely taxed to maintain, which also contribute to unsanitary conditions within the city limits:

HON. WM. BLAIR, *Pres. Board of Managers of the Wisconsin Industrial School for Boys.*

DEAR SIR: Responding promptly to a request, extended through one of your honorable board, by his excellency, Governor Wm. E. Smith, I have this day made a careful sanitary inspection of the institution at Waukesha, and have the honor to make

THE FOLLOWING REPORT:

I found eleven cases of fever among the 500 inmates of the Industrial School. From persons in charge and from members of the Board, I learned that since the first of August there have been twenty-five cases of fever among the boys, with four deaths, and five cases of fever among the officers and employes, with one death. If we add the case of a child of the Superintendent, the whole number of cases will be thirty-one.

KIND OF FEVER.

The fever is not a malignant type of typhoid as at first supposed. Five deaths in thirty-one cases do not indicate a malignant type of any disease. The fever is not epidemic for

thirty-one cases in a population of about 500 boys, teachers, servants, employes and officers, during a period of over sixty days, while not indicative of healthfulness, do not reveal an amount of disease that ought to create a public panic. The same number of cases, with the same amount of mortality, in a country village of 500 inhabitants, during the sickly autumnal season, would not create any special alarm. The fever may be described as typho-malarial. There is considerable fever of the same type in various parts of the State at the close of an unusually dry season.

CAUSE OF THE FEVER.

When the country was newer, the malarial poison of the earth produced fever and ague, or intermittant fever. Since the country has been more cultivated, the same poison, given off from the earth in smaller quantities, has produced every year more or less remittent or bilious fever. Where drinking water is polluted by the proximity of privy vaults and unclean barn-yards, a new poison is added, which gives the fever an enteric or typhoid type. This is exactly the case at the Industrial School.

SANITARY DEFECTS OF THE INSTITUTION.

In order to make this matter clear, allow me to recapitulate facts with which you are perfectly familiar, and to give them the proper interpretation, with which you cannot be expected to be familiar, for such interpretation belongs to the special province of the sanitary expert. The ground on which your fine institution stands is nearly level. The surface is about seventeen feet above the adjacent river. Consequently the chance for drainage is excellent. A black, porous loam, two or three feet thick, covers the surface of the ground. Beneath this uppermost layer is a sheet of light-colored clay, also two or three feet thick. Under the clay there is a deep bed of coarse gravel, through which water or other liquids will flow without much obstruction. Several huge old privy vaults, dug down through the surface loam and the underlying sheet of clay into this very pervious gravel bed, have been covered up here and there on the premises. In these buried vaults are at least

a hundred tons of human ordure in a state of putrefaction. The wells from which the institution has been supplied with drinking water are also sunk into the underlying gravel. That the contents of these old putrid vaults have contaminated the wells I have no doubt. Neither have I any doubt that the excretal contamination of the drinking water has given to the autumnal fevers in your institution an enteric or typhoid type. At least one of the fever cases that I saw exhibited the *tache rose lenticulaire* of Louis, which is regarded as diagnostic of typhoid.

The surface of the ground on which the institution stands, being very rich in mould, contains an abundance of vegetable matter, which undergoing decomposition in the heat of summer generates malarial poison. As there is no drainage of the surface soil, there has been exposure to malarial fever from that source. These two causes undrained ground and contamination of drinking water from privy vaults, will account for the moderate outbreak of typho-malarial fever in the Industrial School.

ANOTHER CAUSE OF COMPLAINT.

The dormitories of the institution are greatly crowded. Forty and fifty boys sleep in rooms that are not large enough for half the number. Your honorable board are fully alive to this defect and have pointed it out to the State Legislature in strong language that ought to arouse public attention.

In passing I may also add that the manure from the hog-house and the stables is thrown out upon the ground and left to steep in the rain and rot in a slovenly manner. These buildings, however, are so far from the habitations of your institution that there is a minimum of danger from this source.

THINGS TO BE COMMENDED.

Very admirable is your present system of removing all excrement from the premises to the land on the farm every day. The "dry removal" is extremely satisfactory in its results, and is the main cause why the buildings are entirely free from any taint of sewer-gas.

The ventilation is also good and the general cleanliness above praise. The constant use of copperas as a disinfectant is highly commendable. The kindly and assiduous attention to the sick makes the institution seem like a home to the unfortunates. The intelligent young physician who has charge of the fever cases is entitled to thanks for his skill and devotion to difficult duty.

THINGS THAT NEED TO BE DONE.

(1.) The buried privy vaults should be cleaned out as soon as the weather becomes a little cooler, and their foul contents removed to the land. Then disinfect these evil graves with quick lime and fill them up with clean earth. The drinking water will then slowly lose its pollution and after some months will become sweet. In the meantime continue to get pure spring water for your inmates as you are now doing.

(2.) The grounds around the buildings should be thoroughly drained with agricultural tile. Three main drains may be extended parallel with the rows of buildings, running to the river. Smaller side drains, leading into the main ones, will remove the water from the surface soil and arrest malaria. The opportunity for thorough drainage is excellent and thereby the sanitary condition of the institution would be greatly improved.

(3.) The sick should be isolated as far as possible, and great pains should be taken to disinfect the discharges and clothing of enteric fever patients. For disinfecting discharges a solution (1 ½ lbs. to the gallon) of copperas is excellent. For clothing, bed linen, etc., use a solution of sulphate of zinc and common salt boiling hot. Two ounces of salt and four ounces of the sulphate to the gallon of water are the right proportions. Wash the clothes and bed-linen of infected patients separately, after scalding with the disinfectant. Carbolic acid is costly and its efficacy greatly overestimated.

(4.) Allow me to recommend one thing more. Use sawdust, chaff, straw, or some other substance, to keep the stables and swine house entirely dry and to absorb all the urine of the animals. Then let the whole be carted off to the compost heap. This process will

make the manure just about six times more valuable for the farm and will keep the ground around the outbuildings clean and wholesome. To perfect the arrangement, include the ground about the barns in the plan of drainage.

Your board is entitled to great credit for taking prompt measures to arrest the first threatenings of an epidemic in your admirably conducted institution. There has been no concealment of anything and my personal thanks are due for courtesies received from the officers of the institution and for all kinds of information promptly given in response to questions.

O. W. WIGHT, M. D.

The time is not far distant when the managers of the Soldiers' Home, the new Insane Asylum at Wauwatosa, and other suburban institutions, will be required to cease running their sewage into the rivers that traverse this city. I therefore give in this connection, for their benefit, and the benefit of any institutions that find the problem of sewerage perplexing, a full description, from an intelligent Boston correspondent, of the

DRAINAGE SYSTEM

adopted in the Woman's Reformatory Prison at Sherborn, Massachusetts.

"The admirable structure at Sherborn for the reformatory prison for women proved to have one serious drawback. Its drainage system was inadequate. The sewage was all sent to a tank of suitable size, and at a goodly distance from the house. From this tank, after settling, it was conveyed upon the land and thence into an open drain leading to a brook belonging to the Cochituate water basin. This open drain still emits its foul odors,—the old system not yet having been done away with. It is the cause of sickness, and it is believed that the illness and death of Miss Eliza Pierce, the late chaplain of the prison, is directly traceable to its malign influence. The last legislature made an appropriation of \$13,000 for a new system of drainage, coupled

with some absurd, if not impossible, conditions, so to speak. The commissioners were authorized to expend this money for drainage, but they were forbidden to drain, directly or indirectly, into Lake Cochituate. The buildings of the prison are on a height of land which slopes toward the affluents of the forbidden lake. The problem, therefore, seems to be a difficult one. The sewage must be disposed of, and it must not be sent into any place where it would naturally go; nor were the commission allowed money enough to send it anywhere else!

"It was under these circumstances that the commissioners called in the services of Mr. George E. Waring, Jr., the eminent sanitary engineer. Mr. Waring has planned a simple but effective system by which 30,000 gallons of sewage can be disposed of every twenty-four hours, and at the same time every particle of it be utilized for irrigation purposes. Nor will there be any exhalation or obnoxious gas to infect the air. On Saturday last the system devised for the prison was tried for the first time, and was found to work precisely as was expected. In this trial-experiment, water was used, as the system of distributing pipes is not quite finished, and the old arrangement is, therefore, still in use. To witness the experiment Mr. Waring and the commissioner had invited several gentlemen. Colonel Waring and his able assistant, Mr. Edward C. Medcalf, explained fully and clearly the plan and its operations.

"It is proper to say that with Mr. Waring the plan was not in the least an experiment. He had already put it in operation in the town of Lenox, where it disposes of the sewage of the entire village, has stood the test of two winters, and is now known to be a success. An important, if not indispensable, adjunct is Field's flush-tank, a contrivance invented by Mr. Rogers Field of London, and patented in this country. The sewage is first conducted through a six-inch underground pipe into what is called the settling basin, twenty-one feet by eight, and four feet six to the spring of the covering arch, which rises six inches to its centre. Adjoining the settling basin, on one of its longest sides, are two others, called flush-tanks, each ten by twenty feet, and of the same depth with

the settling basin. These are on the identical principle of Field's tank, but are on a large scale. At the outward end of each tank is a siphon pit, four feet square and six inches deeper than the flush-tanks. A brick wall eighteen inches high divides equally the bottom of the siphon pit, and through the upper part of this wall is a short siphon, with its long arm toward the outlet at the bottom of the pit. A long siphon connects the siphon pit with the adjoining flush-tank, the long arm being in the pit, with its mouth below the division wall and on the same side with the short arm of the small siphon. When the sewage in the flush-tanks has reached the spring of the covering arch it commences to flow over into the siphon pit through the large siphon, which is so constructed that the air is driven out of its long arm, and the accumulation of fluid inside of the division walls seals its mouth and establishes a powerful current. And now, from the other side of this eighteen-inch-high division wall commences the outflow of sewage in a six-inch pipe. The two streams from the siphon-pits unite, then flow in a single pipe two feet under ground to the distant meadow, there to be distributed.

"The meadow has an area of four and a half acres. It was a bog-hole, full of trees, stumps and stones. At an expenditure of about \$2,500—from the funds of the appropriation—the stumps have been pulled up and the stones removed. The stones form massive walls on two sides of the meadow. The land has been thoroughly cleaned of brush, and is now fit for a garden of roses. A system of sole-tile drains—a line of drain every twenty feet and four to five feet below the surface—has removed all the sour bog-water and left the land dry and solid. These drains discharge into a deep, open drain, with sodded sides and a plank floor, and along this open drain the water flows clear and sparkling, being, in fact, pure spring water. Above these low-down drains, and only one foot below the surface, at intervals of six feet, is a system of distributing pipes. These are twelve inches long, round, with an opening of about two inches. They rest in troughs of the same material and length, but laid so as to break joints. The joints of the distributing tiles are covered with two-inch caps of the same material, to keep out the earth. The six-inch main conducts the sewage from the

outlet of the siphon pits down to and along the highest side of the meadow, which has a perfect grade and slope towards the open ditch. From the main are frequent distributing pipes, and these supply the small two-inch distributors. When all the distributors are laid there will be four miles of distributing pipes, and they can take up and hold 2,500 gallons of sewage; but the flush-tanks unitedly will dispose of 15,000 gallons at each tremendous pulsation; and this will take place nearly twice a day, inasmuch as the discharge of sewage is now about 25,000 gallons a day. It will thus be seen that the distributing pipes will have to dispose of six times as much sewage as they can hold in the time that it takes for the siphons to empty the flush-tanks. Nor is the sewage allowed to flow through and out at their extreme ends. In reality all the sewage percolates through the joints as the party on Saturday had the opportunity of seeing. The earth then absorbs the liquid, and after cleansing it of all its impurities sends it to the low-down, sole-tile drains, through which it finds its way to the open drain, there making its appearance as sparkling spring water.

"The plan contemplates a use of the system of distributing pipes in rotation, so that, although there will be a greater demand on the section in use, the land of the other section will be at rest, and will be used for a crop not requiring abundant moisture. Doubtless experience will teach the best mode of using the system. There will be opportunity for testing the purity of the water coming from the low-down drain pipes, and of the capacity of the land as an absorbent; also of the value of sewage for sub-irrigation. The amount of water used in the building per day, and run out in sewage, can be ascertained to a gallon. This experiment will also demonstrate what can be done with the sewage of our inland towns and cities. If the sewage of an institution containing 400 persons can be disposed of by sub-irrigation, and without detriment to public health, within the space of a few acres, then why may not the sewage of whole villages, and considerable cities, be so disposed of? In truth the system is in use in the large mining town of Merthyr-Tydvil in Wales, and in other towns of Great Britain, as reported in the books of engineers."

I have no noubt that every considerable State institution in Wisconsin needs, for sanitary safety, to adopt a similar system of drainage. Those within polluting reach of Milwaukee will be compelled to adopt such a system, as soon as provision is here made to clean the rivers.¹

1. Those having occasion to study the system in detail will do well to procure Col. Waring's little book, entitled "Village Improvements."

IV. PUBLIC BATHS.

The following report to the Common Council will explain itself:

OFFICE OF THE COMMISSIONER OF HEALTH, }
MILWAUKEE, May 14, 1879. }

To the Honorable the Common Council:

GENTLEMEN: I have just received officially the following resolution:

"Resolved, That the Commissioner of Health be and is hereby instructed to prepare proper rules for the regulation of the public baths on Canal street, and to submit such rules to this Council for approval;"

Which resolution was passed by the Council at its session on the 12th of May, 1879. In obedience to the instruction of the Council, I have the honor to report the following rules for the regulation of any baths maintained at the public expense in the City of Milwaukee:

1. Every person using the public baths shall register his or her name and address in a book provided for that purpose.
2. Every person too young to comply with the previous rule must be accompanied by a responsible attendant.
3. When the water is colder than 60° F. the baths shall be closed.
4. When the temperature of the water is between 60° and 70° F., the time for bathing shall be limited to five minutes, exclusive of a reasonable time for undressing and dressing.

5. When the temperature of the water is above 70° F., the time for bathing shall be limited to ten minutes, exclusive of a reasonable time for undressing and dressing.

6. The baths shall be open exclusively for males from 5 o'clock to 9 o'clock A. M.

7. The baths shall be open exclusively for women with children (under 7 years of age) from 9:30 o'clock to 11:30 o'clock A. M.

8. The baths shall be open exclusively for females from 2 o'clock to 5 o'clock P. M.

9. The baths shall be open exclusively for males from 5:30 o'clock P. M., to half an hour past sundown.

10. Bathers shall not spatter, duck, push, nor in any manner interfere with one another in the baths.

11. Bathers shall not use obscene or profane language, and shall not shout or engage in boistrous conversation.

12. The same person shall not be allowed to use the baths twice on the same day.

13. Persons in charge of the baths shall maintain and observe order and decorum, and shall see that the rules are obeyed.

14. A policeman shall be detailed to preserve order at the baths in the evening and to see that the same are closed at the prescribed time.

15. No person in a state of intoxication shall be allowed to use the baths.

16. All bathers over twelve years of age shall use some kind of dress ample enough to preserve decorum.

17. The baths shall be closed at 12 o'clock M., on Sundays.

The time allowed for bathing may appear short, but it is in accordance with the laws of health. Besides, as there are many bathers, the regulations should be such as to accomodate the greatest number. The baths are a gratuity and the public authority has a right to make just such conditions for their use as it thinks best. The regulations contemplate closing the baths two hours at

noon. As a bath is known to be injurious just before and an hour after a full meal, the wisdom of closing the bathing place a couple of hours at dinner time will be appreciated. It will also be observed that an interval of a half hour is properly allowed for change from one sex to the other in using the baths. As rules are good for nothing without law to enforce them, I herewith respectfully submit to the Council the following draft of

AN ORDINANCE

To provide for the maintenance of order and decorum at any bathing places established at the public expense in the City of Milwaukee.

The Mayor and Common Council of the City of Milwaukee do ordain as follows:

SECTION 1. Any person violating any of the rules adopted by the Common Council for the regulation of any baths maintained at the public expense in the City of Milwaukee shall upon conviction thereof be subject to a fine not exceeding five dollars, in the discretion of the court.

SEC. 2. Any person found lurking about such baths for the purpose of obtaining a view of bathers of the opposite sex shall be subject to arrest, and upon conviction shall pay a fine of not less than five dollars nor more than twenty five dollars.

SEC. 3. This ordinance shall be in force from and after its publication.

Respectfully submitted,

O. W. WIGHT, M. D.

At a subsequent meeting of the Council the rules were adopted and the ordinance was passed. The baths on Canal street were put in order under the superintendence of Commissioner Ebert, of the Board of Public Works. They were open from June 11th to September 15th and were used by 31,864 bathers. Such a number plainly and emphatically indicates that free public baths are demanded by our people.

There are great difficulties in the way of establishing public baths in the City of Milwaukee. The lake water is too cold for safe bathing during the whole season. The water of the rivers is too foul for such a purpose. It would require a large expenditure of money to erect works for warming water to be used by so many persons. If we can ever get the rivers clean, then we can easily and cheaply establish free public baths.

V. GARBAGE CONTRACT.

The following communication to the Common Council gives the preiliminary history of the existing garbage contract:

OFFICE OF THE COMMISSIONER OF HEALTH, }
MILWAUKEE, NOV. 10, 1879. }

To the Honorable the Common Council :

GENTLEMEN: On the 11th day of September last, bids for the removal of garbage, offal and dead animals, from the City of Milwaukee for one year, were opened, after legal advertisement in the official papers soliciting the same. The lowest bidder failed to procure sufficient sureties and the Commissioner of Health advertised a second time. The new bids were opened on the 26th day of September, and the contract was awarded to C. H. Sullivan and C. Forestall, under the firm name of Sullivan & Co., subject to the approval of the Common Council. They furnished sureties acceptable to the City Comptroller, and the contract, drawn by the City Attorney, was referred to the Council at its session on the 29th of September. The Council referred the matter to the Committee on Health, a majority of whom reported adversely to the Council at its session on the 27th of October. As the Council did not act either way on the report of the committee, so far as said report pertained to this contract, the matter remains among unfinished business.

The old contract for removal of garbage, etc., expired by limitation on the 30th of September. The new contract, sent two days previous to the Council, remaining unapproved, there was no

provision for removing garbage, offal and dead animals. The weather being very warm, the unsavory material accumulated to the great distress of citizens. After ten days' delay, the accumulating offensive matter became an unbearable public nuisance, and the Commissioner of Health assumed the responsibility of hiring teams for its removal. Fourteen teams were engaged at twenty-six dollars per day from Herman & Co., the old garbage contractors. The Council at its last session very properly and very justly sanctioned the necessary action of the Commissioner of Health by a formal resolution.

Herman & Co., in the meantime having refused to furnish garbage teams any longer, the Commissioner of Health, after a little delay, hired ten or twelve teams from Sullivan & Co., the lowest bidders for the new contract. An opportunity was thus afforded for testing the capacity of the parties to the proposed contract. I must say, in justice, that they have shown themselves efficient and trustworthy. As their sureties have been approved by the Comptroller, and as the contract price is not, in my judgment, too high, I advise the Council to approve the contract

The following resolution, therefore, is respectfully submitted for the action of your honorable body:

Resolved, By the Common Council, that the Commissioner of Health be and is hereby authorized to enter into a contract with C. H. Sullivan & C. Forestall, for removing garbage, offal and dead animals from the City of Milwaukee, for one year from the date of said contract, at the price of \$790 per month, and all other resolutions conflicting herewith are hereby repealed.

Respectfully Submitted,

O. W. WIGHT, M. D.,

Commissioner of Health.

On motion of Alderman Paine, the rules were suspended, and the resolution adopted—ayes thirty-two, noes none.

In pursuance of the foregoing resolution, the Commissioner of Health entered into a contract on the part of the city with Sullivan & Co., to remove garbage, etc., for one year. During the six or seven weeks between the expiring of the old contract and the commencement of the new, garbage accumulated in spite of

irregular efforts to remove it. Citizens, not understanding the cause, naturally complained. The contractors entered upon their work with energy and soon relieved the city of a multitudinous nuisance. Complaints are now rare and fine is imposed upon the contractors for every case of real negligence.

The sum of \$790 per month for the removal of garbage seems large to many citizens. The City of Boston pays \$76,000 a year for the gathering and disposal of garbage. The population of Boston is 360,000, just about three times that of Milwaukee. By ratio of population, that would give \$25,000 a year for removal of garbage in this city. Yet the ground traveled over in gathering garbage is just about the same in Milwaukee as in Boston. The work here is really done for about one-eighth of what it costs there.

Street cleaning in Boston costs \$83,000 per annum. In Milwaukee it costs \$53,000. By ratio of population, it should cost here less than \$28,000. It really costs about sixty per cent. of the outlay in Boston for the same purpose; while garbage removal here costs only about twelve per cent. of the expenditure for its removal there.

It is a promising fact that the present contractors are removing twice the amount of garbage removed by the contractors of last year. If all the people would keep broken glass, medicine bottles, ashes, and other things that kill swine, out of their garbage boxes, the material would have considerable value for feeding, and the contract could be let at a lower price.

VI. DISINFECTANTS.

It is pleasant to find the pet traditions of mankind substantiated by the conclusions of exact science. The Greeks used the fumes of burning sulphur, or sulphurous acid, to disinfect their temples after sacrificial rites. The same abundant material has been used in the same way as a purifier ever since we have any history of the world. Dr. Lind, in his "Philosophy of Medicine," wrote nearly a century ago, "It gives me the highest satisfaction to affirm that I seldom or never knew a proper application of the fumes of sulphur to be unsuccessful in effectually purifying all tainted places, materials and substances. I have known, in several ships where there are the fairest opportunities of trying things of this nature, that the contagion of small-pox has been entirely stopped by means of wood fires sprinkled with brim-stone, kept burning closely confined in the infected place." It is not necessary to multiply testimony on this point.

It is also a tradition descended to us from former centuries that vinegar, or acetic acid, is a disinfectant. The Arabians since the time of Avicenna have greatly prized it. During the plague of Marseilles four thieves who plundered the dead without infection were condemned to death. Their lives were spared upon condition that they should reveal the means of their immunity from the disease. Their security was simply from the use of aromatic vinegar. For this reason it is still sometimes called in France, "*Le vinaigre des quatre voleurs*," the vinegar of the four thieves. Cardinal Wolsey carried a sponge soaked in vinegar within an

orange peel to preserve himself from infection by the crowd. Here again it is not necessary to multiply testimony.

The very latest experiments in sanitary science demonstrate the high value of these two traditional purifiers. Dr. John Dougall, lecturer on materia medica in the Glasgow Royal Infirmary School of Medicine, and an esteemed officer of health, has conclusively shown that all acids, especially the mineral acids, are real disinfectants. Dr. Dougall gives, as late as November last, the results of his long researches and many experiments, in the following very lucid language:

"If a clear, fresh, putrescible fluid be set aside for a short time, and then examined by the microscope, it will be found swarming with bacteria and their allies in active motion, fœtid, and opaque. Its reaction is neutral; but these changes would ensue though it were made moderately alkaline or *very faintly* acid. If it be now exposed in a cool dark place for from nine to twelve months, and then examined, it will still be found swarming with life, cloudy, fœtid, and containing albumen. In a few months later, putrefactive reduction is completed. The solution may be still cloudy, but is now almost free from fœtor; a bacterium is only seen here and there; a faint trace of albumen may or may not be detected; and its specific gravity, at first perhaps about 1.6, is now probably about 1.1 or 1.2. Such are the chief physical phenomena of putrefaction. As regards its chemical aspects, the chief elements in animal matter are oxygen, hydrogen, carbon, nitrogen, phosphorus, and sulphur. The hydrogen unites with the oxygen to form water; with the nitrogen to form ammonia; with the sulphur, phosphorus, and carbon, to form sulphuretted, phosphoretted, and carburetted hydrogen gases. The oxygen also unites with the carbon to form carbonic anhydride. In course of time, the ammonia is oxidised into nitrous and nitric acids and water; the sulphuretted hydrogen into sulphurous and sulphuric acids and water; the phosphoretted hydrogen into phosphoric acid and water. These free acids then at once combine with any bases present to form their respective salts. Putrefaction is thus seen to be a process of reduction; and the greater the number of equivalents of elements forming the atoms of

a compound, the more easily does such a compound decompose. This instability is increased in animal substances by their containing nitrogen, which has less tenacity in its affinities than any of the elements. The large quantity of water present also forms a most favorable medium for putrefaction, which only takes place at death, as then the chemical forces by which the living tissues act on vital organic compounds cease, and the elements of the original compounds unite to form bodies less complex, but more stable, as described above.

“If to another portion of the same clear, fresh, putrescible fluid, a quantity of acid, mineral or vegetable, be added, so as to cause marked acidity, and the mixture be then placed under the same conditions as the former, then in a day or two it shows quite a new set of changes. One or more small tufts of mycelia are present, their silky filaments radiating from a tiny nucleus; also numerous free spores and double torulaceous cells. If the proper quantity of acid have been added, no bacteria are present, and the fluid, instead of becoming hazy, becomes clearer and sparkling. Its reaction is of course distinctly acid, its odour somewhat mouldy, but not at all unpleasant; while, in about four months, it ceases to respond to albumen tests, indicating that decomposition is completed. This is fermentation. Again, if to a portion of a putrefying fluid a slight excess of acid be added, putrefaction is soon arrested, and the mixture, instead of being then fetid, has an odor like that of oil of spiræa. And if to separate portions of a fresh and of a fermenting albuminous fluid, a larger quantity of acid be added than is sufficient to cause fermentation alone, then the fresh fluid neither putrefies nor ferments; fermentation is arrested in the fermenting fluid; and both mixtures remain in this antiseptic state for an indefinite time, and latterly cease to respond to albumen tests.

“Now, these results seem to me strong proofs that putrefaction and fermentation, whatever be the chemical changes they produce on solutions of animal fluids, are distinct processes. There is abundant evidence that putrefying matter is very injurious to health,

but there is little or none to show the effects of fermenting matter in this respect. It is obvious, however, that fermentation must be harmless as compared with putrescence. Putrid matter evolving noxious effluvia for nearly twelve months¹ must be more hurtful than the same matter when fermenting, it being always almost odorless and fully decomposed in about four months. Moreover, as already observed, acids added in excess both prevent and arrest putrefaction and fermentation; and this not by antiseption but by destruction, as is shown by the animal solution ultimately ceasing to respond to the tests for albumen, without the physical signs of either putrefaction or fermentation having been present."

After relating an abundance of very interesting and substantiating clinical experience, Dr. Dougall gives clear directions for the use of acids as follows:

"For disinfecting, I advise the use of three acids—hydrochloric, sulphurous and aromatic glacial acetic. The hydrochloric consists of one of the strong acid to twenty of water, and is used chiefly to disinfect typhoid excreta, and the bed and body clothes of persons with infectious disease. In typhoid cases, a large cupful of this fluid is put in the vessel before it is used. After being emptied down the water-closet, it is rinsed with another cupful, which is also at once put down the closet, the water running while this is being done. In using this fluid for clothes, these only require to be sprinkled with it, so as to sensibly damp them, allowing them to remain so for about four hours; but of course saturation for about an hour is preferable. With thick woollen clothes, such as blankets, however, an inconveniently large quantity of the acid fluid is needed for saturation. It is worth remembering, in such cases, that wool resists the action of acids far more than cotton or linen, and as this material is more likely, from its porous nature, to retain infection than the latter, it should be subjected longer to the action of the

1. I have a bottleful of beef-juice prepared about five years ago, which is still quite putrid: its contents have, however, been kept from air and light. From this can be inferred the time which animal solids may lie festering in a choked or improperly flushed drain.

acid. Boiling water is afterwards poured over the acidified clothes, which are allowed to stand for an hour. They are then thoroughly rinsed with warm water till all the acid is got rid of, when soap with soda or potash may be used to wash them. If the acid be not removed, the soap will not form a lather. The solution of this acid may also be used for sprinkling on floors, pouring down sinks, etc.

"The sulphurous acid is used exclusively for aerial disinfection, which is done morning and night during the patient's illness, not only in the patient's apartment, but in every room in the house. The process is simple; a piece of live coal is placed on a shovel and powdered sulphur sprinkled on it. The sulphurous fumes thus generated should be made to impregnate the entire atmosphere of the house, until it becomes somewhat irritable. If more fumes have been generated than can be tolerated, the excess is easily got rid of by opening the doors and windows, and by allowing what may be still forming to ascend the chimney. Fifteen minutes is sufficient to allow the acid to act each time it is used; but if the apartment be empty, it may be used some hours. Mattresses and carpets can be disinfected with sulphur fumes by suspending them spread out by the four corners with ropes, and allowing the acid to float thickly along the lower surface for ten minutes, then turning them upside down, and repeating the process. Bright metallic surfaces are darkened by sulphurous acid.

"The aromatic glacial acetic acid, though more than a hundred times the price of the others, gives great satisfaction in the using, its well known grateful cooling odor forming a pleasant contrast to the repulsive emanations from the body of an infectious patient. It consists, besides the acid, of the oils of rosemary, neroli, cinnamon, cloves, bergamot, lavender and rectified spirit. I frequently use this acid as an occasional aerial disinfectant, but never to the exclusion of sulphurous fumes. It is directed to be dropped on a hot shovel and volatilized through the house daily, which is the more effective way; or, where its price is a consideration, a little may be poured occasionally into a small vessel of hot water, placed over the gas, in the patient's room, by which means it becomes more

gradually dissipated, producing at the same time a constant pleasant odor in the apartment. I have had much satisfaction also in using it dilute—one drachm to one ounce of water—for sponging the body, by which two objects are attained—lowering of the temperature and disinfection of the skin. Almost without exception, patients like this process, and are usually much refreshed by it. In all scarlatinal cases, more especially during desquamation, I invariably direct this to be done twice daily. The practice, so much in vogue, of smearing the skin of a scarlatinal patient during desquamation with lard or warm suet, to prevent the morbid epithelial *debris* from scattering, seems to me highly calculated to injure the sufferer. By this means the mouths of the sebaceous and sudoriparous glands, the very channels through which, in all probability, the poison finds egress from the blood, are plastered up; so that, besides the unpleasantness it causes, it is an effectual way of sealing the infective matter in the body. It looks precisely analogous to hermetically closing every door, window, crack and crevice in a room where a person is lying soaked with infection. On the other hand, by sponging the skin with the aromatic acid, the infectious scurf is permanently deprived of its dangerous properties, while, at the same time, the numerous orifices of the gland-ducts are cleared of their morbid secretions, thus giving free exit to the poison from the blood. Moreover, it is well known, and has been proved experimentally, that the evaporation and oxidation of most perfume-yielding oils, including those in aromatic acetic acid, generate ozone—a powerful disinfectant. Here, then, is another strong recommendation for sponging the body with the substance in question, as by this means an atmosphere of ozone may actually be made to evolve gradually and constantly from the patient's skin, floating under the bed clothes and enveloping every part of the body.¹

“It has been urged, as a fatal objection to the use of acids in disinfecting enteric excreta, unsupported, however, by any experimental or practical data, that they corrode and destroy the metallic

1. Vinegar in which dried rose leaves are steeped is almost equally precious.—W.

fittings of the water-closet. That this objection, applied to hydrochloric acid, is, for all practical purposes, quite groundless, I have proven hundreds of times; hence it seems to me entirely superfluous to give examples to confute it.

"In conclusion, it may be stated, as a summary of the foregoing, that putrefaction may be prevented, neutralized or arrested, or its odor masked or neutralized, and yet any infective matter present, be, in all probability, unaffected, preserved, or only made dormant for a brief period, as exhaustive experiments with carbolic acid and infective fluids, more especially with vaccine, show; that to use purely antiseptic substances as antizymotics is highly paradoxical, preservation being practiced and destruction anticipated; further, that the mineral acids are true disinfectants, operating by both physical and chemical destruction, and also by transformation of organic molecules, as in fermentation; hence, they prevent and arrest putrefaction, they transform putrefaction into fermentation; they deodorize; and, moreover, they are highly antizymotic as regards vaccine, virus of glanders, virus of infective inflammation, and therefore, by inference, as regards all other infections."

I commend this newest doctrine of disinfection especially to the attention of physicians within my sanitary jurisdiction. A few general observations and directions are here appended for the benefit of those for whom this report is especially made.

1. Nature's first great purifier is fresh air, the oxygen of which slowly burns up all filth exposed to it. Therefore let the free air of heaven into every nook and corner where putrefying matter or disease germs may lurk. In the gospel of sanitation, this is the first great commandment.

2. And the second is like unto it—growing vegetation transforms in the miraculous alembic of nature dangerous decaying matter into new and wholesome life. Therefore plant trees over buried privy vaults and sow grass seed on the ground soaked with slops about your habitations.

3. Avoid patent disinfectants. All of them are dear; most of them promise more than they can perform; many of them betray you into a false belief of security; some of them are worthless.

4. Carbolic acid is a precious antiseptic, but is not a disinfectant. As a destroyer of disease-germs it is almost worthless. It is not an acid at all.

5. Copperas, which is sulphuric acid and iron in combination, costs less than two cents a pound, and has more value as a disinfectant for common use than any other single thing. Mix a pound of it with a gallon of water for use. A dipper-full of the mixture will sweeten a foul drain or a stinking vault. Two quarts of it will disinfect 500 gallons of ordinary sewage. Remember that it stains everything it touches and is somewhat poisonous.

6. To the excellent directions of Dr. Dougall as to the use of hydrochloric, sulphurous, and acetic acids, I will only add that for the disinfection of rooms in which contagious disease has been, the least costly and one of the most efficacious methods is to burn sulphur in them, evolving sulphurous acid, one pound to every 100 cubic feet of air space. The rooms should be closed tight for two or three hours during and after the burning of the sulphur and then be thoroughly aired for twenty-four hours before use.

7. Boiling-hot water kills many disease-germs. Nearly all disease-germs are killed by dry heat at 240° F. A higher degree of heat than that is likely to injure textile fabrics.

8. Deodorizers are not always disinfectants, although disinfectants are generally deodorizers. As an example, take Condyl's fluid, a solution of permanganate of potash. It is a good deodorizer, but a poor disinfectant. It requires ten ounces of Condyl's fluid to disinfect one ounce of enteric fæces, and two ounces to disinfect an ounce of enteric urine. In other words, one ounce of enteric fæces will deoxidize ten ounces of Condyl's fluid, and one ounce of enteric urine will deoxidize two ounces of the same fluid. At the usual cost, it would therefore require five dollars worth of Condyl's fluid to disinfect the alvine and renal discharges of the average typhoid patient during twenty-four hours. In a hospital

with thirty typhoid fever patients it would take over \$50,000 worth of Condy's fluid to thoroughly disinfect after them for a year. A very much less amount would deodorize after the same number and thus give to the unscientific a dangerous and deceptive feeling of security.

It was not my intention to write exhaustively on this subject. I have already said enough to fulfil my purpose. A chemist cannot properly discuss the difficult subject of disinfectants. Neither can a pathologist. Chemist and pathologist must be united in the same person to grapple with it successfully. Dr. Dougall is entitled to gratitude for his exposition of a new doctrine of disinfection, founded in exact science and promising a rich harvest of practical and beneficent results.

VII. QUALIFICATIONS REQUIRED OF HEALTH OFFICERS IN GREAT BRITAIN.

The leading universities of Great Britain now grant degrees or certificates in Public Health or State Medicine. It is well for our municipal governments to know what qualifications are regarded as necessary for public health officers in the country that has taken the lead in sanitary administration. And this report will fall into the hands of the many inexperienced American officers of health who will be glad to know what course of special study will best qualify them for discharging their arduous and responsible duties.

UNIVERSITY OF CAMBRIDGE.

Any person whose name is on the *Medical Register* of the United Kingdom may present himself for examination, provided he be in his twenty-fourth year at least when he presents himself for the first part of the examination, and have attained twenty-four years of age before he presents himself for the second part.

Part I comprises Physics and Chemistry; the principles of Chemistry, and methods of analysis, with especial reference to analyses of air and water; application of the microscope; the laws of heat, and the principles of pneumatics, hydrostatics and hydraulics, with especial reference to ventilation, water-supply, drainage, construction of dwellings, disposal of sewage and refuse, and sanitary engineering in general.

Part II will comprise—laws of the realm relating to public health; sanitary statistics; origin, propagation, pathology and prevention of epidemic and infectious diseases; effects of overcrowding, vitiated air, impure water, and bad or insufficient food; unhealthy occupations and the diseases to which they give rise; water-supply and drainage in reference to health; nuisances injurious to health; distribution of diseases within the United Kingdom, and effects of soil, season* and climate.

The examinations in both parts will be oral and practical as well as in writing.

Every candidate who has passed both parts of the examination to the satisfaction of the examiners, will receive a certificate testifying to his competent knowledge of what is required for the duties of a Medical Officer of Health.

UNIVERSITY OF LONDON.

A special examination is held once in every year in subjects relating to Public Health, and commences on the second Monday in December. No candidate is admitted to this examination unless he have passed the second examination for the degree of Bachelor of Medicine in this university at least one year previously. Candidates are examined in the following subjects: 1. *Chemistry and Microscopy*, as regards the examination of air, water and food; 2. *Meteorology*, as regards general knowledge of meteorological conditions, and the reading and correction of instruments; 3. *Geology*, as regards general knowledge of rocks, their conformation and chemical composition, and their relation to underground water, and to drainage and sources of water-supply; 4. *Physics and Sanitary Apparatus*; the laws of heat, mechanics, pneumatics, hydrostatics and hydraulics, in relation to the construction of dwellings, and to warming, ventilation, drainage and water-supply, and to apparatus for these and other sanitary uses; the reading of plans, sections, scales, etc., in regard of sanitary constructions and appliances; 5. *Vital Statistics*, as regards the methods employed for determining the health of a community; birth-rate; death-rate; disease-rate; life-tables; duration and expectancy of life; present amount of mortality

at the various ages, and its causes, in different classes and communities; practical statistics of armies, navies, civil professions, asylums, hospitals, dispensaries, lying-in establishments, prisons, in-door and out-door paupers, friendly societies, sick-clubs, medical and surgical practice, towns; 6. *Hygiene*, including the causation and prevention of disease. Reference shall be had to such matters as the following: parentage; temperament; morbid diatheses; congenital diseases and malformations; effects of close interbreeding; special liabilities at particular periods of life; physical regimen of different ages; earth and climate, and changes of season; dampness of soil; malaria; conditions of healthy nourishment; conditions of healthy lodgment; conditions of healthy activity; hygiene of particular establishments and particular classes of population; disease as distributed in England; particular diseases, as regards their intimate nature, causation, and preventability; processes of contagion in different diseases; incubation; particular dangers of infection, etc.; disinfectants, and establishments for disinfection; quarantine; hospitals for infectious disease; conveyance of the sick; vaccination; prostitution; diseases of domestic animals in relation to the health of man; rabies; diseases of the vegetable kingdom, and failures of vegetable crops, in relation to the health of man; famine-diseases; poisons in manufacture, and commercial domestic use; 7. *Sanitary Law*, as regards the Public Health Act, 1875; the Vaccination Acts; the Rivers Pollution Prevention Act; the Sale of Food and Drugs Act; the Artisans' and Laborers' Dwellings Improvement Act, 1875; the Acts regulating the Medical Profession and the Practice of Pharmacy; the Acts relating to Factories and Workplaces, and to the Detention and Care of Lunatics. The examination is written and practical, and extends over four days. Candidates are not approved by the examiners unless they have shown a competent knowledge in all the principal subjects.

UNIVERSITY OF DURHAM.

Certificates of proficiency in sanitary science are granted under the following regulations:

1. The candidate must be a registered medical practitioner.

2. He must have attended one course of Lectures on Public Health at the University of Durham College of Medicine, Newcastle-upon-Tyne, during one winter session.

3. He must pass an examination on the following subjects:

- a. Physics*—Laws of light, heat, hydrodynamics, and pneumatics.
- b. Chemistry*—As applied to the detection of noxious gases and atmospheric impurities, analysis of air and water.
- c. Sanitary Legislation*—Knowledge of the Acts of Parliament in force for the preservation and protection of health.
- d. Vital Statistics*.—Rates of births, deaths, and marriages; the methods of calculation, classification, and tabulation of returns of sickness and mortality; data and conclusions deducible therefrom.
- e. Meteorology, Climatology, and Geographical Distribution of Diseases in the United Kingdom.*
- f. Sanitary Medicine*, more especially epidemic, endemic, epizootic, and communicable diseases; diseases attributable to heat, cold or damp; insufficiency or impurity of air, food, or drink; habitation, occupation, over-exertion, intemperance, heredity; preventive measures, vaccination, isolation, disinfection; the regulation of noxious and offensive manufactures and trades, the removal of nuisances.
- g. Practical Hygiene*, in reference to site, materials, construction, lighting, ventilation, warmth, dryness, water-supply, and refuse-disposal of dwellings, schools, hospitals, and other buildings of public and private resort; action with respect to nuisances and outbreaks of disease; other duties of a medical officer of health.—The examination is by written papers, practical, and *viva voce*. In the practical examination, the candidate is required: 1. To report upon the condition of some actual locality; 2. To analyze liquids and gases; 3. To explain the construction and the uses of instruments employed in meteorology; 4. To make microscopic examinations.

UNIVERSITY OF EDINBURGH.

This University gives the degrees of Bachelor and Doctor of Science in Public Health, under the following conditions:

Bachelor of Science.—1. The candidate must be a Graduate in Medicine of a British University, or of such Colonial, Indian, or Foreign University as may be specially recognized by the University Court. 2. He must be matriculated for the year in which he appears for examination. 3. If the candidate have not passed an *annus medicus* in the University of Edinburgh, he must, before presenting himself for examination, have attended in the University at least two courses of instruction, scientific or professional, bearing on the subjects of the examinations. 4. There are two examinations for the degree of Bachelor of Science in the department of Public Health. A candidate who has passed the first examination may proceed to the second at the next period fixed for this, or at any subsequent examination. 5. The candidate must produce evidence that, either during his medical studies or subsequently, he has attended a course of lectures in which instruction was given on Public Health; and that he has studied Analytical Chemistry practically for three months with a recognised teacher. 6. The examinations are written, oral, and practical, and are conducted by University examiners selected by the University Court. 7. The subjects of the examination for the degree of Bachelor of Science in the department of Public Health are as follows:

First Examination.—1. *Chemistry*—Analysis of air, detection of gaseous emanations and other impurities in the atmosphere; analysis of water for domestic use, and determination of the nature and amount of their mineral and organic constituents; detection, chemical and microscopical, of adulteration in articles of food and drink, and in drugs; practical examination, including at least two analytical researches. 2. *Physics*—Hydraulics and hydrostatics, in reference to water-supply, drainage and sewerage; pneumatics, in relation to warming and ventilation; meteorology, and methods of making meteorological observations; mensuration, in reference to the plans and sections of public and private buildings, mines, water works, and sewers. The candidate must make figured sketches for models. 3. *Sanitary Law*—Knowledge of the leading Sanitary Acts of Parliament. 4. *Vital Statistics*—Knowledge of statistical methods and data in reference to popula-

tion, births, marriages, and deaths. An oral examination, and an examination in practical chemistry in the laboratory, will take place a few days after the written examination.

Second Examination—1. *Medicine*—Origin, nature, and propagation of epidemic and contagious diseases; prevention of contagion and infection; endemic diseases, and the geographical distribution of disease; insalubrious trades; overcrowding; epizootics, including pathological changes. 2. *Practical Sanitation*—Duties of a health-officer in reference to water-supply; insalubrious dwellings and public buildings; removal and disposal of sewage and other refuse and impurities; cemeteries, nuisances from manufactories, etc.; bad or insufficient supplies of food; outbreaks of zymotic diseases; quarantine; disinfectants and deodorisers; construction of permanent and temporary hospitals.

Doctor of Science.—A Bachelor of Science in the Department of Public Health may, after the lapse of one year, proceed to the degree of Doctor in the same department, on producing evidence that he has been engaged in practical sanitation since he received the degree of Bachelor of Science, and on producing a thesis on some subject embraced in the department of Public Health. Every such thesis must be certified by the candidate to have been composed by himself, and must be approved by the Examiners. The candidate for the degree of D. Sc. must lodge his thesis with the Dean of the Medical Faculty on or before January 31st, in the year in which he proposes to graduate. No thesis will be approved which does not contain either the results of original observations on some subject embraced in the examination for B. Sc., or else a full digest and critical exposition of the opinions and researches of others on the subject selected by the candidate, accompanied by precise references to the publications quoted.

The following are recommended as books to be studied in preparation for the above examinations:—Parkes, E., *Practical Hygiene*; Wilson, George, *Handbook of Hygiene*; Smith, Edw., *Manual for Public Officers of Health*, and *Handbook for Inspectors of Nuisances*; Michael, Corfield, and Wanklyn, *Manual of Public*

Health, edited by F. Hart; Fassie,* *Healthy Houses*; Iatham, Baldwin, *Sanitary Engineering*; Law, Henry, *Rudiments of Civil Engineering*; Monro, Geo., *The Public Health (Scotland) Act*; Buchan, Alex., *Introductory Text-Book of Meteorology*.

UNIVERSITY OF GLASGOW.

All candidates must be registered medical practitioners. Candidates must produce evidence that, either during their medical studies or subsequently, they have attended a course of lectures in which special instruction was given on Public Health; and that they have attended a course of Analytical Chemistry specially bearing upon the subjects of examination, given by recognized teachers. Candidates who have not passed an *annus medicus* in the University of Glasgow must, before presenting themselves for examination, have attended as matriculated students in this University at least two courses of instruction, scientific or professional, bearing on the subjects of the examinations. The examinations are written, oral, and practical.

The examination embraces the following subjects:—*1st Division*.—*Physics*—Pneumatics, hydrostatics, hydraulics. *Chemistry*—Analysis of air, water, and food. *Meteorology*—Climate, topographical and seasonal: its influence in relation to health and disease. *Geographical Distribution of Diseases*. *2nd Division*.—*State Medicine*—Duties of health-officer; ventilation; food and its adulterations; water and water-supply; sewage and drainage; construction of hospitals, public buildings, and dwellings; overcrowding; manufactories; insalubrious trades; cemeteries; nuisances; quarantine; disinfectants and deodorisers; outbreaks of zymotic diseases. *Sanitary Law*—Knowledge of leading Sanitary Acts of Parliament. *Vital Statistics*.

The following are recommended as books for study:—E. Parkes, *Practical Hygiene*; George Willson, *Handbook of Hygiene*; A. H.

Hassall, *Food and its Adulterations*; Lardner and Loewy, *Hydrostatics and Pneumatics*.

ROYAL COLLEGE OF PHYSICIANS OF EDINBURGH.

The Royal College of Physicians of Edinburgh grants a certificate of qualification in Public Health under the following regulations:

Candidates must be already on the *Medical Register*, and possess a qualification in Medicine. They are not required to attend any special course of instruction; but their attention is directed particularly to courses of lectures on State Medicine, and to the practice of Analytical Chemistry. There are two examinations, which may be taken simultaneously or with an interval not exceeding twelve months. The examinations are written, oral, and practical.

Examinations.—The first examination embraces—*a. Physics:* especially pneumatics, hydrostatics, hydraulics, and engineering in relation to sanitary operations, including a knowledge of architectural and other plans, sections, etc.; *b. Chemistry:* especially analysis of air, water, food, including the biology of putrefaction and allied processes; *c. Meteorology:* including climate, topographical and seasonal influences in relation to health and disease.

The second examination embraces—*a. Epidemiology and Endemiology:* including the corresponding departments in the diseases of animals and plants—contagious diseases—diseases of periods of life, professions, trades, seasons, and climate; *b. Practical Hygiene:* duties of a health-officer; food; water-supply; sewage and drainage; construction of hospitals, public buildings, dwellings; manufactories; cemeteries; nuisances; *c. Sanitary Laws and Vital Statistics.*

UNIVERSITY OF DUBLIN.

Doctors of Medicine of Dublin, Oxford, or Cambridge, who wish to obtain from this University a certificate of qualification in State Medicine, can do so on passing an examination in a limited

course of the following subjects: 1, Law; 2, Engineering; 3, Pathology; 4, Vital and Sanitary Statistics; 5, Chemistry; 6, Meteorology; 7, Medical Jurisprudence.

Seventeen out of the twenty great universities of Germany are now giving courses of instruction in State Medicine. The medical schools of the United States are sadly behind the times in neglecting to teach hygiene as the medicine of the future.

However well trained a health officer may be, he must deal hard blows, not only to secure any advancement in sanitary work, but even to maintain the dignity of his position against traditional prejudice and conceited presumption. As Dr. Billings sarcastically says: "Among architects, engineers, lawyers and politicians, a feeling is very common that the sanitarian should confine himself to the pointing out of the evils to be remedied; that he should be a sort of inspector of nuisances, with sufficient knowledge of medicine to give a name to the evil results observed, and that he should leave to them, with their special and superior knowledge, the task of remedying these evils. This plan has been very thoroughly tried, and the results are not satisfactory—in fact, the prevalence of this idea has been one of the causes of the slow progress of hygiene."

VIII. CONSULTING ENGINEERS.¹

At the meeting of the Council on the 8th of September, Alderman Paine introduced the following:

Resolved by the Common Council of the City of Milwaukee, That the Board of Public Works and Commissioner of Health be and are hereby authorized to employ one or two consulting engineers of national reputation to consult with them, with the view of deciding upon the most efficacious and economical mode of solving our sewerage and water works problem, the expense therefor to be paid out of the general city fund.

Referred to Committees on Finance and Sewerage.

The committees reported in favor of the resolution at the next regular meeting of the Council on the 15th of September. The resolution was amended at the next meeting of the Council, on the 29th of September, by adding the words, "and the Board of Public Works and Health Commissioner shall report the name of said engineer, or corps, before so employing him." It was then adopted.

Two weeks later, the Commissioner of Health sent to the Council, at its regular meeting on the 13th of October, the following

1. I had intended this as a conclusion to the chapter on the River Nuisance, but the report of the consulting engineers came too late.

COMMUNICATION:

OFFICE OF THE COMMISSIONER OF HEALTH, }
MILWAUKEE, October 13, 1879. }

To the Honorable the Common Council:

At a regular meeting of the Council, on September 29, 1879, the following resolution: "That the Board of Works and the Commissioner of Health be and are hereby authorized to employ one or two consulting engineers of national reputation to consult with them, with the view of deciding upon the most efficacious and economical mode of solving our sewerage and water works problem, the expenses therefor to be paid out of the general city fund," with the following amendment added thereto: "And the Board of Public Works and Health Commissioner shall report the name of said engineer or corps before so employing him," was unanimously adopted by the aldermen present.

In a spirit of obedience to the resolution of the Council, and of devotion to public duty, I repeatedly sought a conference with the Board of Public Works, in order to agree with them upon the names of consulting engineers to be submitted to your honorable body at its next meeting. Being unable to succeed by verbal application in securing such conference, I finally addressed to the Board the following formal communication:

OFFICE OF THE COMMISSIONER OF HEALTH, }
MILWAUKEE, October 10, 1879. }

To the Board of Public Works:

The head of this Department is ready to meet a representative of your Department at any time and place you may appoint, for the purpose of naming one or more consulting engineers to the Common

Council at its session, on Monday next, in accordance with the resolution and amendment thereof passed by the Council at its last session. Respectfully yours,

(Signed)

O. W. WIGHT, M. D.

Commissioner of Health.

Said communication was insolently returned the next day, with the following endorsement:

"This Board has opened a correspondence with the President and Secretary of the American Society of Engineers, with a view of having said Society recommend to us two of the most eminent engineers in the special branches of engineering relating to sewers and hydraulics.

(Signed)

F. S. BLODGETT,

Sec. Board of Public Works."

At a subsequent interview with a member of the Board of Works, I learned that it was the intention of the Board to await the action of "said society" of engineers, and then to submit the names of the two that might be recommended, to the Common Council. I was not consulted in the matter, and as the Board of Works had independently determined upon their method of procedure, it became apparent that the sanitary department of the city government was not to be consulted at all. It was revealed at the same interview that the City Engineer also had not been consulted.

There is, therefore, no alternative left me but to make a separate report to the Council. The following preliminary considerations seem to me, under the circumstances, to be especially pertinent:

1. The problem in regard to which the citizens and their representatives in the Council are seeking enlightenment is essentially one of sanitation and engineering.
2. The members of the Board of Works are essentially superintendents of construction.

3. They have only a subordinate relation to the engineering department of the municipal government, so far as any problem of engineering is concerned.

4. They have very little practical relation with the Health Department, except the assumed power to grant permits to commit a nuisance, a power frequently exercised, notwithstanding the earnest protests of the Health Commissioner.

5. Consequently, to assume sole charge of a mixed sanitary and engineering problem, ignoring the Health Department and the Engineering Department of the city government, and also in defiance of the spirit and intent of the resolution of the Council, is especially aggressive and insolent on the part of the Board of Works.

6. It was not necessary to keep the people of this city waiting in order to communicate with the President and Secretary of the "American Society of Civil Engineers" in New York. The first letter was not written until one week subsequent to the last meeting of the Council. Said President and Secretary know the engineers of this country well, but they are not conversant with the problem here which we are seeking to solve. There are old members of the "American Society of Civil Engineers" living in this city, who know the engineers of this country quite as well as the President and Secretary, and are entirely familiar with the sanitary and engineering problem which we have to solve. They could have been consulted at any hour. To subject the Council to delay, while enduring the clamors of a distressed community, under pretense of dilatory consultation with the officers of a society of engineers, who live a thousand miles away and are ignorant of our needs, is either a blunder or a subterfuge.

Driven, therefore, by necessity, I hereby respectfully submit to the Common Council the names of the following consulting engineers:

Col. George E. Waring, C. E., of Newport, R. I.

E. S. Chesbrough, C. E., of Chicago, Ill.

Both of these gentlemen have a national reputation as sanitary engineers. The Eighth Annual Report of the State Board of Health of Massachusetts says of Mr. Chesbrough, that he is "one of the first and most experienced sanitary engineers" in this country. (p. 11). Besides, he is familiar with our sewerage system. The blunders in it were made against his protest, by "practical" men who could not be made to credit the evils which he foresaw and predicted, evils which are already upon us. Mr. Waring is noted for his ingenuity in devising ways of getting rid of such sanitary troubles as we are now laboring under, and for the economy of his processes. He has a European as well as American reputation. J. Bailey Denton, of England, who has written the best recent work on sanitary engineering, thus prefaces a long quotation from Waring: "The following valuable remarks, extracted from Mr. Waring's recent work, entitled 'Sanitary Drainage of Houses and Towns,' expresses so clearly what I would myself further say on the subject, that I prefer to quote them rather than to add to my own." (p. 216).

I have consulted resident members of the "American Society of Civil Engineers," who understand well the problem to be solved here, who are also well acquainted with the leading engineers of this country, and they concur with me in the judgment that the two whose names I have submitted to you are, taken all in all, best adapted by their experience and studies to aid us in our difficulties. Regretting the unpleasant necessity of making a lengthy preliminary explanation, I now pass the whole matter over, so far as I am concerned, to the wisdom of the Common Council. Respectfully submitted,

O. W. WIGHT, M. D.,

Commissioner of Health.

The following appears in the proceedings of the Council at a regular meeting on Nov. 10, 1879.

The communication of the Commissioner of Health, appointing consulting engineers, was taken up and the Chair submitted the following communications:

OFFICE OF THE BOARD OF PUBLIC WORKS, }
MILWAUKEE, NOV. 10, 1879. }

To the Honorable the Common Council :

GENTLEMEN: In compliance with a resolution of the Council passed September 29th, ult., the Board of Public Works, and Health Commissioner hereby nominate Mr. E. S. Chesbrough as consulting engineer in deciding upon the most efficacious and economical mode of solving our sewerage and water works problem.

F. S. BLODGETT,
W. T. CASGRAIN,
GEO. A. ABERT,
H. J. HILBERT,

Commissioners of Public Works.

I hereby dissent from the above report, unless George E. Waring is added, and then I agree to it.

O. W. WIGHT, M. D.,

Commissioner of Health.

OFFICE OF THE BOARD OF PUBLIC WORKS, }
MILWAUKEE, NOV. 10, 1879. }

To the Honorable, the Common Council :

GENTLEMEN: This Board and Health Commissioner hereby nominate Messrs. Moses Lane and Geo. E. Waring, Jr., in addition to E. S. Chesbrough, Esq., nominated in another communication as consulting engineers.

F. S. BLODGETT,
W. T. CASGRAIN,
GEO. A. ABERT,

Commissioners of Public Works.

O. W. WIGHT, M. D.,

Commissioner of Health.

Which appointments were confirmed—ayes thirty-one, noes none.

The gentlemen named above were invited and after study of the problem sent in the following

REPORT.

CHICAGO, Ill., Jan. 12, 1880.

Messrs. Hilbert, Blodgett, Casgrain and Abert, Commissioners of Public Works, and Dr. O. W. Wight, Commissioner of Health, Milwaukee, Wis.

GENTLEMEN: In your communication of December 2, 1879, you submit to us the following problems:

1. The best means of abating the river nuisance; the case being stated as follows: "The best method of abating the so-called river nuisance of this city, and to report a definite plan on the same. It is expected of you to recommend through us to the legislative department of the municipal government, the best means of abating the nuisance aforesaid. Any required changes in the sewer system of the city may be pointed out in a general and comprehensive way without entering into elaborate and detailed plans."
2. Possible needed alterations in the water works, stated as follows: "If the plan reported by you shall leave the water supply of the city still liable to pollution from sewage or other deleterious matter, you will then be expected to recommend such changes in the water works as necessity may require, designating the point where the water shall be taken."
3. The advisability of adopting the plan of your City Engineer for a system of intercepting sewers.

After careful consideration of the whole subject, we herewith submit the following report: The foulness of the rivers is due of course to the fact that they receive the outflow of all the sewers of the city, and the organic waste of the slaughter houses and packing houses in the Menomonee Valley, while during the dry seasons their current is insufficient to carry these foul matters forward into the lake. There are no means by which these foreign substances can be purified and made inoffensive after being once delivered into the rivers. Their production is a necessary and constant accompaniment of the life and business of the city. The question is simply

how to dispose of them otherwise, and in such a manner as not to create a nuisance elsewhere. This question is here, as always, one of the gravest connected with municipal administration.

The tendency of the best practice of the world is more and more in the direction of the purification of sewage by application to the land— what is known as irrigation-disposal. There are exceptional cases where these matters may, without injury, be delivered into water courses, or great bodies of water; these exceptions however are rare. The extent to which a delivery into Lake Michigan would be safe with reference to the cleanliness of the shore, and the purity of the water supply, can be determined only by actual experience.

In our judgment, while an outlet into the lake may answer a good temporary purpose, and while it may continue for a long time to be satisfactory during the winter and spring, it would not be safe to rely on this alone. The time must sooner or later come when at least during the summer and autumn such delivery would create a nuisance. We have therefore given much attention to the matter of irrigation-disposal. This method is very extensively applied in Great Britain and on the Continent of Europe. Its introduction has been greatly favored by the hope that it would result in a profitable return from the agricultural operations connected with it. This hope has in almost every instance been disappointed. Instances of profit have been very rare, and there is no sort of probability that the cost of construction, and the considerable pumping charges necessary in the case of Milwaukee would meet with an adequate return from any agricultural result that could be obtained. It would nevertheless be reasonable to expect that the agricultural return would constitute a considerable relief in meeting these charges. This should not however be taken very seriously into the account. The arguments in favor of irrigation-disposal in your case are chiefly of a sanitary character, and they are sufficient. Such disposal would unquestionably secure under a proper adjustment of area of land to amount of sewage, a well purified effluent, so that the drainage from the irrigation farm would enter your streams as pure water.

The certainty of this result and the uncertainty as to the permanent result of an outlet into the lake, make it important that preliminary steps looking to ultimate irrigation-disposal be taken at an early day.

Land well adapted for the purpose, south of the Menomonee Valley, may be found in several quarters, and it can probably be purchased more cheaply now than later. The economical arrangement of the work would require considerable study, and probably the cost would be less and the efficiency greater if ample time were taken for such preliminary preparation. We therefore recommend, in view of the advisability of a resort to irrigation at no distant day, the purchase of about 500 acres of land, if to be obtained at a fair price.

In the suggestions given below, the work has all been regulated with reference to the addition to the general scheme of the irrigation feature, with the least additional cost. So, too, the scheme suggested for immediate adoption is, so far as it goes, precisely what we should advise were irrigation to be undertaken immediately, for in any case it would be necessary to have an alternative arrangement for delivery into the lake during any necessary temporary stoppage of the irrigation works.

We recommend as being less costly, and as requiring less time in construction, (but with the limitations indicated above), a temporary delivery of the whole dry-weather flow of the sewers, together with the necessary flushing water and the foul waste of all business establishments, into the lake at a point one mile south of the present harbor entrance, and 1,000 feet from the shore.

To select a point of outlet north of the present mouth of the river, would increase the liability of offense to the city and would very greatly increase the danger of contaminating the water supply. Probably with an outlet at that point, a new intake for the water works would become absolutely necessary. Sewage matter delivered at the point which we have indicated, (one mile south of the present harbor entrance), would reduce to a minimum the chance of nuisance, and, as the lake water contaminated at that point would have the outflow of the river between it and the present crib, the

probability is very strong that it would not, except under extraordinary circumstances, reach the water supply and even then so diluted as to be inappreciable by the senses.

The sewage of the city can be delivered into the lake only by the aid of pumping, and in order to secure a well flushed condition of the intercepting sewers, pumping from a depth of twelve or fifteen feet will be necessary.

We recommend that the pumping works be located in the Kinnickinnic Valley, not farther north than the old harbor entrance, and that they be built to scale capable of discharging into the lake, at the point indicated above, the whole dry-weather outflow of the city, together with the necessary flushing water, allowance being made for probable increase of population. The intercepting sewers needed to carry the sewage to this point, should, so far as practicable, be laid low enough to admit of their being flushed by the waters of the rivers. The interception of the whole East Side may be by means of a single sewer lying east of the Milwaukee river. In like manner the whole of the West Side and of the South Side may be intercepted at one level. The intercepting sewers should accommodate all sections of the city and should be properly connected and carried across the rivers at suitable points, all delivering at the pumping station. The intercepting sewers should in all cases be connected with the present sewers at points higher than the highest high-water mark, so that during high stages of the lake, the river water may not flow back into the intercepting sewers. This arrangement will require that portions of the city lying on low levels and now connecting with the sewers at points below high-water mark, should have new connections directly with the intercepting sewers, or with the present sewers at points above where their inverts are at high-water level.

It is our idea that, during dry weather when only foul sewage is flowing in the sewers, the whole of it should be conveyed to the pumping station, and sent into the lake, but that during rains, when the flow would be too great for the capacity of the pumps, pumping should cease entirely, allowing the intercepting sewers to fill, and

the whole outflow to pass out at the present mouths of the sewers into the rivers. The foul matter discharged at such times would be much diluted, and the rainfall would give a current to the rivers which would render such temporary delivery into them unimportant. After the storm water has ceased running in the street gutters, pumping can be resumed.

It is proper here to refer to the well-studied plan of intercepting sewers prepared by your City Engineer, and submitted to our notice. We have deviated from his suggestions so far as to dispense with his middle and high-level sewers, for the reason that for the dry weather flow, these would be unnecessary, and that the cost of pumping they would save would not equal the interest on their extra cost. As stated above, the foul ingredients of the whole storm flow will be so much diluted, that it will be safe to discharge it directly into the rivers at a time when their current is increased by rain.

The Commissioner of Health has submitted to us a suggestion that in addition to the present sewers, a separate set of small pipe sewers be laid throughout the city to receive and carry to the pumping station all domestic and manufacturing waste, leaving the present sewers to serve only the purpose of discharging storm water, street wash, and subsoil drainage. While we fully appreciate the advantages of a separate system of sewers for house drainage, we have considered it our duty to take the existing conditions of the city as we find them, and to turn its existing works to the best use, in seeking the end desired. If the present sewers are not in good order, they can be made so for much less than the cost of a new system of sewers. Being in good order, it is only necessary to secure their proper flushing to enable them to work with full effect as an aid to the abatement of the river nuisance. We therefore recommend:

1. That all sewers in the city be thoroughly and minutely inspected, a record being made of every imperfection, and that systematic repair or reconstruction be undertaken at once.
2. That at the heads of the sewers there be constructed suitable self-acting flush tanks to secure the thorough daily cleansing

not only of the dead ends of the sewers, where the discharge of the solid matters from house drains is sometimes too great for the liquid discharge of the houses to carry it forward, but also in connection with flushing apparatus advisable at other points, sufficient to remove any deposit of road detritus, etc., which, owing to the inclination, the form, or the roughness of the sewer, may be found to collect. To secure the full flushing effect of the discharge of the flush tanks and apparatus, and of the natural flow, and to prevent contamination of the soil by sewage matters, the sewers should be made, if they are not so already, as nearly water-tight as possible, especially to the height of their usual flow line.

3. The establishment of a system of frequent periodic inspection, to be continued until it shall have been demonstrated that the adjustment of the flushing arrangements is effective in every part of the sewers.

These recommendations being carried out, there will be secured the important condition suggested by the Commissioner of Health:—that all foul matters be delivered at the outlet before decomposition has set in,—such decomposition now taking place in the sewers, or in the rivers, being probably the most serious factor in the present foul condition of the latter. The evils to be apprehended from the delivery of sewage into the lake, will be greatly less serious when the discharge of all organic matter in a fresh condition shall have been secured.

As we are in doubt as to what the future may develop in regard to the necessity for a new point of intake for the water works, it seems unadvisable now to suggest further expenditure in that direction, which may not be required for a long time if the sewage is delivered in a fresh condition into the lake south of the river outlet, and which surely will not be required after the system of irrigation-disposal is adopted.

At the same time, as such a scheme has been considered, and as its execution may still become expedient, we recommend that the requisite preliminary details upon which to base future calculations as to such work be obtained.

We believe that the complete carrying out of the foregoing suggestions will result in a permanent abatement of what is known as the River Nuisance.¹ Very respectfully,

E. S. CHESBROUGH,
MOSES LANE,
GEO. E. WARING, JR.

1. My own ideas on this subject have been already expressed and I see no reasons for changing them.—W.

IX. PACKING HOUSES.

Having demonstrated in my annual report that there is no necessity, inherent in the business, for slaughtering and rendering establishments to deliver into the air nauseous vapors, to the great discomfort of the inhabitants of a wide surrounding region, and that such vapors may be consumed without unreasonable cost and trouble on the premises where they are produced, I issued early in the summer after the close of the packing season, the following order to all the proprietors of the packing-houses in the Menomonee Valley:

HEALTH DEPARTMENT OF THE CITY OF MILWAUKEE. }
OFFICE OF THE COMMISSIONER OF HEALTH, }
MILWAUKEE, June 2, 1879. }

To Mr. _____

You are hereby notified and ordered, as owner, agent, or occupant of the premises known as _____ packing house in the Menomonee Valley,

To cease putting the contents of the entrails of slaughtered animals or any refuse of any kind from such slaughtered animals and all "tankings" into the Menominee river or any canal or bayou connected therewith or onto the ground within the City of Milwaukee;

to remove in water-tight covered wagons beyond the limits of said city all offal, blood, or rejected parts of slaughtered animals, and all "tankings," every day when slaughtering is done on the premises aforesaid, or, in lieu thereof, to construct on your said premises a drying-house wherein all such matter as aforesaid may be dried in such a manner as to create no public nuisance; and to construct on your premises aforesaid suitable apparatus in which all aqueous vapors from rendering tanks and drying-houses may be condensed and from which all organic vapors from any source may be conducted, mixed with a sufficient quantity of atmosphere, and be wholly consumed in the fire of one or more furnaces on said premises; within ninety days from the date hereof, under penalty imposed by Section forty-six, Chapter XII, of the general ordinances of the City of Milwaukee, passed April 20, 1875, which section, as amended by an act of the Legislature "relating to the Health Department of the City of Milwaukee," approved February 23, 1878, being chapter thirty-six, local laws of 1878, reads as follows:

SECTION 46. Every person who shall disobey any order of the Commissioner of Health of this city, made under and in pursuance of section five, of chapter thirteen of the act of the legislature mentioned in the preceding section, which shall have been personally served upon him, shall, on complaint of the Commissioner of Health, or any person serving such order, before the Municipal Court, be punished by a fine not exceeding \$500, or by imprisonment not exceeding six months, or by both such fine and imprisonment.

The reference in this ordinance is to an act of the legislature of Wisconsin, entitled "An act to revise, consolidate and amend the charter of the City of Milwaukee, approved February 20, 1852, and the several acts amendatory thereof," approved March 10, 1874, being chapter 184 of the laws of 1874, of which the fourth and fifth sections, as amended by said act of February 23, 1878, read as follows:

SECTION 4. The Commissioner of Health, or any person acting under his orders, shall have authority to enter into and

examine, at any time, all buildings, lots, and places of all descriptions, within the city, for the purpose of ascertaining the condition thereof so far as the public health may be affected thereby.

SECTION 5. The Commissioner of Health shall give all such directions, and adopt all such measures, for cleansing and purifying all such buildings, lots and other places, and for causing the removal therefrom of all noxious substances producing a disagreeable smell, or tending to cause sickness and disease, as in his opinion shall be deemed necessary; and he may do or cause to be done whatever in his judgment shall be needful to carry out such measures. Every person who shall disobey any order of the Commissioner of Health which shall have been personally served upon him, requiring him to abate or remove any nuisance, or to cleanse or to purify any premises owned or occupied by him, in the manner or at the time described in the order, shall, on complaint of the Commissioner of Health, or any person serving such order, before the Municipal Court of said city, be liable to arrest and summary trial; and punishment by fine not exceeding \$500, or by imprisonment not exceeding six months, or by both such fine and imprisonment in the discretion of the court.

O. W. WIGHT, M. D.,
Commissioner of Health.

I am very glad to be able to state in this report that the proprietors of the packing-houses cheerfully complied with the order, like good, law-abiding citizens. The result is that thirty or forty thousand people on the West Side and South Side of the City of Milwaukee are this winter, for the first time in many years, almost wholly freed from the sickening smell of the great slaughtering and rendering establishments of the Menomonee Valley. The washings of the packing-houses still flow into the river. The amount of organic matter, mixed with great quantities of water used to clean up after the daily handling and slaughtering of six or seven thousand swine, is very considerable and adds much to a nuisance that has

been elsewhere discussed. When the city itself ceases to foul the rivers and provides a proper sewer system, individuals engaged in manufacturing businesses contributing largely to the prosperity of the place will cheerfully comply with regulations to keep the rivers clean and wholesome.

X. DETAILED FINANCIAL STATEMENT.

, All the items of expenditures made by this Department during the year 1879 are here given. The account includes, as usual, most of the expenditures of the last month of the previous year.

I. EXPENDITURES.

Dec. 30.	Ed. Keogh, printing blanks.....	\$	10 84
	Wm. Harper, lights.....		1 50
	John Dolge, disinfecting up to Dec. 3, 1878.....		36 00
	Salaries for December, 1878:		
	O. W. Wight.....		166 66
	E. W. Diercks.....		66 66
	E. H. G. Meachem.....		41 66
	A. F. Kalkhoff.....		41 66
	E. W. Tallmadge.....		41 66
	Geo. Koepfel.....		50 00
Jan. 13.	Alphons Kalkhoff, disinfecting material.....		16 00
	Ed. Keogh, printing monthly report.....		8 44
	Des Forges & Co., stationary.....		15 71
27.	E. L. Griffin, vaccine points.....		1 50
	John Dolge, disinfecting to Dec. 31, 1878.....		44 00
	Ed. Keogh, printing 2,000 death certificates.....		2 00
31.	Salaries for February:		
	O. W. Wight.....		166 66
	E. W. Diercks.....		66 66
	E. H. G. Meachem.....		41 66
	A. F. Kalckhoff.....		41 66
	E. W. Tallmadge.....		41 66
	Geo. Koepfel.....		50 00

DETAILED FINANCIAL STATEMENT.

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Feb. 5.	J. S. White, postage stamps and postal cards.....\$	21 50
	C. H. Clark, repairing, dating stamp.....	2 00
	Gallun Bros., copper kettle.....	3 85
	Milwaukee Hospital, charges for diptheria patient.....	15 00
	Ed. Keogh, printing blanks.....	10 17
10.	Ch. Prusser & Bro., clock.....	3 25
	Des Forges & Co., stationary.....	14 90
28.	Salaries for February:	
	O. W. Wight.....	166 66
	E. W. Diercks.....	66 66
	E. H. G. Meachem.....	41 66
	A. F. Kalckhoff.....	41 66
	E. W. Tallmadge.....	41 66
	George Koepfel.....	50 00
March 3.	John Dolge, disinfecting, including material, Jan. 2 to 16..	34 00
	do do do do do 17 to 31.	30 00
	George Koepfel, livery hire and kerosene oil.....	4 00
21.	Jas. S. White, postage stamps.....	16 50
	Seifert & Schoeffel, 1,000 maps.....	75 00
	John Dolge, disinfecting Feb. 1 to 28.....	45 00
	W. E. Goodman, repairing pipes.....	5 45
	Ed. Keogh, printing annual report, blanks and postal cards.....	578 16
31.	Des Forges & Co., stationery.....	14 50
	Salaries for March:	
	O. W. Wight.....	166 66
	E. W. Diercks.....	66 66
	E. H. G. Meachem.....	41 66
	A. F. Kalckhoff.....	41 66
	E. W. Tallmadge.....	41 66
	George Koepfel.....	50 00
April 15.	J. B. Hoeger & Son, for stationary.....	7 18
21.	John Dolge, disinfecting, March.....	62 00
	M. C. Miller, for eighteen days livery.....	45 00
25.	Jas. S. White, for postage stamps.....	3 00
30.	O. W. Wight, salary.....	166 00
	E. W. Diercks.....	66 66
	E. H. G. Meachem.....	41 66
	A. F. Kalckhoff.....	41 66
	E. W. Tallmadge.....	41 66
	Geo. Koepfel.....	50 00
May 9.	Jas. S. White, postage stamps.....	5 00

May 12.	E. L. Griffin, vaccine points.....\$	1 50
	A. W. Phelps, coal.....	5 95
17.	Jas. S. White, postage stamps.....	12 00
19.	Milwaukee News, advertising notices.....	9 00
	Ed. Keogh, wrapping reports.....	31 00
	do printing mortuary report for March and April and resetting report.....	21 34
31.	O. W. Wight, salary.....	166 66
	E. W. Diercks.....	66 66
	E. H. G. Meachem.....	41 66
	A. F. Kalckhoff.....	41 66
	E. W. Tallmadge.....	41 66
	Geo. Koepfel.....	50 00
June 9.	J. B. Hoeger & Son, stationery.....	3 18
	O. W. Wight, cash advanced for subscription to Sanitarian for 1879 and Sanitary Council of Mississippi Valley..	13 00
	John Dolge, disinfecting during April.....	41 00
16.	do do do May.....	41 00
23.	Ed. Keogh, for printing mortality report for May.....	8 00
	J. B. Hoeger & Son, stationary.....	12 20
30.	O. W. Wight, salary.....	166 66
	E. W. Diercks.....	66 66
	E. H. G. Meachem.....	41 66
	A. F. Kalckhoff.....	41 66
	Geo. Koepfel.....	50 00
	E. W. Tallmadge.....	41 66
July 21.	John Dolge, disinfecting during June.....	35 00
	Jas. S. White, postage stamps.....	7 50
31.	O. W. Wight, salary.....	166 66
	E. W. Diercks.....	66 66
	E. H. G. Meachem.....	41 66
	A. F. Kalckhoff.....	41 66
	E. W. Tallmadge.....	41 66
	Geo. Koepfel.....	50 00
Aug. 4.	Wm. Hogg, City Directory.....	4 00
18.	Ed. Keogh, printing blanks.....	10 00
	J. B. Hoeger & Son, stationary.....	6 13
	John Dolge, disinfecting in July.....	35 00
	Hunter & Good, ribbon and stamps.....	2 50
	Baumbach & Rosenthal, disinfecting material.....	9 00
	Chas. H. Warner, for services of self and horse.....	17 50
30.	O. W. Wight, salary.....	166 66

DETAILED FINANCIAL STATEMENT.

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Aug. 30.	E. W. Diercks.....	\$ 66 66
	E. H. G. Meachem	41 66
	A. F. Kalckhoff.....	41 66
	E. W. Tallmadge.....	41 66
	Geo. Koepfel.....	50 00
Sept. 1.	Ed. Keogh, printing mortuary report, July.....	7 00
	Jas. S. White, postage stamps.....	13 00
8.	John Dolge, disinfecting in August.....	35 00
	Chas. H. Warner, services of self and horse.....	35 00
15.	Ed. Keogh, printing report, Aug.....	21 00
29.	O. W. Wight, salary.....	166 66
	E. W. Diercks.....	66 66
	E. H. G. Meachem.....	42 66
	A. F. Kalckhoff.....	41 66
	E. W. Tallmadge.....	41 66
	Geo. Koepfel.....	50 00
Oct. 13.	Jas. S. White, postage stdmps.....	7 50
27.	Ed. Keogh, printing.....	11 00
	Chas. H. Warner, services of self and horse.....	35 00
	Wm. Huth, care of diphtheria patients at Passavant Hospital	11 00
	John Dolge, disinfecting in Sept.....	35 00
	O. W. Wight, cash advanced.....	11 80
31.	O. W. Wight, salary.....	166 66
	E. W. Diercks.....	66 66
	E. H. Meachem.....	41 66
	A. F. Kalckhoff.....	41 66
	E. W. Tallmadge.....	41 66
	Geo. Koepfel.....	50 00
Nov. 1.	Jas. S. White, postage stamps.....	8 50
10.	Richard Burke, phonographic minutes in river nuisance investigation.....	25 00
21.	Jas. S. White, postage stamps.....	15 00
24.	Banuer & Volksfreund, advertising.....	2 76
	Chas. H. Warner, services self and horse.....	35 00
	John Dolge, disinfecting in Oct.....	35 00
	Ed. Keogh, printing.....	11 50
	J. B. Hoeger & Son, stationary.....	11 00
30.	O. W. Wight, salary.....	166 66
	E. W. Diercks.....	66 66
	E. H. G. Meachem.....	41 66
	A. F. Kalckhoff.....	41 66

Nov. 30.	E. W. Tallmadge	\$	41 66
	Geo. Koepfel		50 00
Dec. 1.	Baumbach & Rosenthal, disinfecting material		27 00
8.	E. W. Diercks, cash advanced		9 45
18.	Jas. S. White, postage stamps		4 00
	John Dolge, disinfecting in November		35 00
31.	O. W. Wight, salary		166 66
	E. W. Diercks		66 66
	E. H. G. Meachem		41 66
	A. F. Kalckhoff		41 66
	E. W. Tallmadge		41 66
	Geo. Koepfel		50 00
Total amount of bills audited during 1879.		\$	7,207 16

RECAPITULATION.

Expenditures for part of December, 1878, paid in January, 1879.	\$	456 64
Expenditures for year 1879.		6,750 52
Total	\$	7,207 16

II. CREDIT.

Ballance on hand Dec. 31, 1878.	\$	6,507 98
Appropriation for 1879.		5,000 00
		<hr/>
		\$11,507 98
Balance, Dec. 31, 1879.	\$	4,300 82

Although the appropriation last year for the use of this Department was only one-half of the usual amount, there still appears a balance at the end of the year of more than \$4,000 to the credit of the health fund of the city. The real expenditure of the year is considerably less than \$7,000 for a very large amount of work done.

XI. ALPHABETICAL SUMMARY

*Of Nuisances Declared, Inspections Made and Business Transacted
by the Health Office During the Year 1879.*

BY E. W. DIERCKS, SECRETARY.

Alleys, numbers declared public nuisances, 28.

Baths, ordinances and rules regulating, passed June 2.

Bids, invited for collection of Garbage, Offal, etc., Sept. 11.

Invited for collection of Garbage, Offal, etc., Sept. 26.

Invited for collection of Garbage, Offal, etc., Nov. 8.

Circulars, one issued to Principals of Public Schools, Nov. 13.

In relation to Public Baths, May 14.

Burial Permits, May 20.

Keeping of Hogs, May 28.

To Milk-venders, June 10.

Scavengers, to testify about River Nuisance, Aug. 20.

Packers, to testify about River Nuisance, Aug. 21.

Dredgers, to testify about River Nuisance, Aug. 22.

Tanners, to testify about River Nuisance, Aug. 23.

Brewers, to testify about River Nuisance, Aug. 23.

Distillers, to testify about River Nuisance, Aug. 24.

Butchers, to testify about River Nuisance, Aug. 26.

Engineers, to testify about River Nuisance, Aug. 27.

Undertakers and Cemetery Associations, concerning infected bodies in vaults, June 16.

Physicians, concerning reports of deaths, 1879.

R. R., concerning sewers at stock yards.

Circulars, one issued to R. R. companies, concerning transportation of ice to City, March 22.

Clergymen, Undertakers and others forbidding public funerals in case of contagious disease.

Commissioner's, inspections of miscellaneous matters, 246.

Orders, number of special, 40.

Permits, to Pork Packers for shipment abroad.

Shippers of Merchandise to Yellow Fever District and to persons visiting said District, 5.

References, to Board of Public Works, 56.

Chief of Fire Department, 1.

Chief of Police Department, 7.

District Attorney, 4

Superintendent of Poor, 25.

Coroner, 12.

Reports, to Common Council.

Relating to Paper Bag Traffic, May 24.

Quack Physicians, Jan. 27.

Milk, June 9.

Milk, Aug. 4.

Hogs, Aug. 23.

Plan and cost for abatement of River Nuisance.

Condition of River at Leopold & Austrain's dock, June 30.

Stating lowest Garbage bid, Sept. 29.

In relation to appointment of experts on River Nuisance, Oct. 13.

Recommending contract for collecting Garbage, November 10.

Complaints, entered and acted on, 1809.

Condemnations, made by Meat Inspector, 63.

Contract, for collection of Garbage, Offal and Dead Animals, with J. Hermann & Co., expired, Sept. 30.

The same in the entire City, let to C. H. Sullivan & Co., Nov. 13.

Cisterns, foul state of, report about, 3.

Dead Animals, reported, removed by contract, 850.

Death Certificates, reported, 2249.

Examinations, made by Health Inspectors, 1212.

Meat Inspector, 3664.

Fines, imposed by Commissioner on Garbage and Offal Contractors, \$61.

In Municipal Court for violation of Health Ordinances, \$25.

Garbage, Collectors of, Notices to, 16.

Loads of, collected, 5459½, at a cost of \$4297.66 or about 79c. a load.

Houses, disinfected, 833, and as many pounds of fumigators; cost per house, including material, 70c.

Placarded, 872.

Hospital, Passavant, patients cared for at City expense, 2.

Deaths at, none.

Inspections by Commissioner, of Milk Stables, 227, Jan. 5 to March 1.

City Slaughter House, March 19.

Hermann's Stink Factory, Town of Lake.

West Side Kindergarten on Seventh street,
May 19.

Night Scavenger Wagons and Garbage Vehicles, April 28 and Aug. 14.

Milwaukee, Menomonee and Kinnickinnic
Rivers, Aug. 18 and Dec. 2.

Store Building, 117—123 Huron St., cellar
covered with water, July 7.

Foul Cistern at 1524 Vliet Street, July 19.

Alley near Chamber of Commerce, Broadway, May 20.

Adolph Reinecke's Rendering Works, Canal
Street, Sixth Ward, April 19.

Nuisance on Division and East Water Sts.,
excavation for new store, April.

Alley, block 73, Fourth Ward, Goodrich's
Wharf, June 19.

Kirby Starch Works, Walnut St., July 18 and
Oct. 29.

District School Buildings in the City.

Meiner's Distillery, Town of Wauwatosa.

Plankinton & Armour's Packing House.

Layton & Co's. Packing House.

P. McCeogh's Packing House.

J. Hermann & Co's., Slaughter House.

School lot, on Twentieth and Brown Streets,
Ninth Ward.

Limits, established by Ordinance, July 21, within which two swine may be kept for family use, as follows:

First Ward, all lying north of North St.
 Second Ward, all lying west of Thirteenth St.
 Fourth Ward, all lying west of Twenty-seventh St.
 Sixth Ward, all lying north of Lloyd St.
 Eighth Ward, all lying west of Muskego Road.
 Ninth Ward, all lying north of Walnut and west of Sixteenth Sts.
 Tenth Ward, all lying north of Lloyd St.
 Eleventh Ward, entire.
 Twelfth Ward, entire.
 Thirteenth Ward, entire.

Established by Commissioner for cutting of Ice.

Meetings, of Committee of Health at Office, June 28, Oct. 4 and 23.

In relation to River Nuisance, Aug. 20, 21, 22, 23, 26, 27 and Dec. 2.

Midwives, number of, registered during year, 25.

Total registered at end of year, 49.

Rejected at end of year, 5.

Notices, number, total sent out by Police, being orders to abate Nuisances; to fill or drain; to clean privies, etc., in duplicate, 883.

To Teachers, and to call at Office, 244.

Nuisances, lots, reported to Common Council, 86.

Privies on Public School lots, 19.

From which have been removed 483 yards.

Complained of during the year, 1809; of which number only a small fraction remain unabated.

Orders, to Packers to desist running Offal into sewers connected with River or into River, June 2.

Scavengers, March 25, April 29 and May 17.

Contractors on Lincoln Avenue, to cause human bones exhumed by grading to be reburied, Dec. 9.

Ice dealers, to state location for Store Houses, and Names and Residences of Employees, who distribute the same, April 19.

Clean privies, issued during year, 456.

Remove and abate Nuisances, 250.

Owners or Agents of Real Estate to comply with Health Ordinances, 177.

- Orders, to Ward Foremen, to desist using Street Cleanings for filling, 7.
 Disinfectors, in relation to time of disinfecting, Jan. 14.
 Board of Public Works forbidding filth for filling lots, Jan. 16 and March 29.
 D. C. Abbey, in relation to condemned Beef, May 28.
 Fish Dealers, forbidding selling Fish caught below entrance of Sewers, June 9.
 J. Hermann & Co., to hold certain maimed beef at Slaughter House, March 12
 To report to Office, before allowing maimed beeves to go from City Slaughter House, June 13.
 Garbage Contractors, to employ five more teams, June 24.
 To employ sufficient number of teams by day's work, until further notice, Oct. 6.
 To stop collecting Garbage, Oct. 31.
 C. H. Sullivan & Co., to collect Garbage, with sufficient number of teams, from Nov. 1 to 13.
 Principals of Public and Private Schools, forbidding admittance to Schools after Children are reported Sick, until they receive Certificate of Recovery, Nov. 13.
 Isidore Alkan, not to dispose of damaged Beef from City Slaughter House, March 13.
 Dr. J. E. Johnson, in relation to his practicing Medicine, July 24.
 James Bonnen, to make Sanitary Improvements at House, 144 Michigan Street, March 6.
 L. Wechselberg, not to dispose of carcase of Diseased Animal at City Slaughter House, March 13.
 Concerning Ice from Skating Rink, unloaded in Zoebel Street.
 Permits, for Burial, 2257.
 Cleaning Privy Vaults, 887.
 Removing Privy Vaults, 4.
 Police, aid of, requested in 3 cases.
 Letters sent out by, 1127.
 Privies, contents of cleaned, measuring 3044 yards.
 Public School well declared Nuisance, March 15.
 Privies declared Nuisance, July 14.
 Streets declared Nuisance, 16.
 Recovery, certificates of, issued, 651.
 Reports, of Health Inspector filed, 522.
 of Meat Inspector filed, 275.

Reports, of Transactions at Office, to Council, Feb. 10, May 5, Aug. 18 and Nov. 10.

Weekly, Deaths and Sick Cases, to Press.

Rules, for Night Scavengers, issued, March 25.

Garbage Collectors, Oct. 6 and Nov. 1.

Disinfector, Jan. 14, March 25 and June 30.

Scavengers, Night, Number of licensed at end of year, 8.

Ordinance reducing price to \$2.50 per yard, Nov. 24.

Sick Cases, Recorded: Diphtheria, 1012.

Scarletina, 120.

Suits, commenced in Municipal Court, 14.

Trials, in Nuisance Court, about 1100.

Vaccinations, made by Order of the Commissioner.

MORTUARY AND METEROLOGICAL TABLES.

"The registration of deaths in its present form is of no scientific value; and, except the inference which may be drawn from the total number of deaths as compared with those by zymotic causes, is useless for scientific purposes. . . . The table as at present constituted places deaths, which have had a similar origin, in every part of the list. . . . A large portion of the deaths which now arise are due to causes which are not, and cannot be, registered. I especially refer to those which have had a syphilitic origin, or which have been caused by continuous indulgence in intoxicating drinks. A very large portion of the diseases which affect particular organs, and in which the first starting-point is a kind of fatty degeneration of tissue, have their origin in the habitual use of intoxicating liquors. Head, heart, liver, kidney, lung, are all subject to this change, and the consequences are diffused over the whole list."—DR. ALFRED CARPENTER.



MORTUARY AND METEOROLOGICAL TABLES.

Vital statistics are still of great value after all possible deductions are made on account of inaccuracies. Careless physicians and ignorant quacks will return, under proper pressure of law, at least the whole number of deaths, with statements of age, sex and nativity. The average mortality of a community, with its more obvious conditions, may thus be determined with precision. It is not necessary to dwell upon the importance of a reliable death-rate. And it so happens that the diseases which are most influenced by sanitary administration are easily recognized. A death from small-pox is never attributed to any other cause. Nearly every mother of a family knows scarlet fever as well as the doctor. Diagnosis of diphtheria baffles few except those perverse or wicked practitioners who wish to avoid reporting it to the health authority. Consumption is sadly familiar in most households, and its presence is known without the intervention of a learned pathologist. Remote causes of premature death may be beyond the ken of the medical layman and the ordinary doctor, but it is not necessary to throw away vital statistics because they are not perfect. It would be unwise to throw away all statutes because legislation has not reached an ideal standard. Science should not be abandoned because it has not explored all the secrets of nature. There is much that is extremely valuable in vital statistics, although the defects in returns of the causes of mortality wring words of regret and impatience from the wisest and best of sanitarians. I know well how much is wanting in the following tables, but I do not propose to throw away the good wheat because it is unavoidably mixed with at least an equal quantity of worthless chaff. Toil and patience will more and more increase the former and diminish the latter. The law requiring burial permits has been strictly enforced, and the death-rate at least may be relied on for its accuracy.

MONTHLY REPORT OF DEATHS

FOR

JANUARY 1879.

CAUSES OF DEATH.

CLASS I—Zymotic.		
ORDER 1—Miasmatic.		
Cynanche trachealis (Membranous Croup).....	14	
Diarrhoea acuta (Acute Diarrhoea).....	2	
Diarrhoea chronica (Chronic Diarrhoea).....	1	
Diphtheria (Diphtheria)...	23	
Febris intermittens (Intermittent Fever).....	2	
Febris typhoides (Typhoid Fever).....	2	
Morbilli (Measles).....	2	
Pertussis (Whooping Cough).....	2	
Pyæmia (Pyæmia).....	1	
ORDER 2—Enthetic.		
Phagadæna gangrænosa (Hospital Gangrene).....	1	
CLASS II—Constitutional.		
ORDER 1—Diathetic.		
Asthma (Spasmodic Asthma).....	1	
Carcinoma (Cancer of Uterus).....	1	
Leucocythæmia.....	1	
ORDER 2—Tubercular.		
Hydrocephalus.....	3	
Meningitis tuberculosis (Tubercular Meningitis).....	1	
Peritonitis tuberculosis (Tubercular Peritonitis).....	1	
Phthisis pulmonalis (Consumption).....	10	
Scrofula (Scrofula).....	1	
CLASS III—Local.		
ORDER 1—Nervous.		
Apoplexia (Apoplexy).....	6	
Convulsio (Convulsions)...	22	
Encephalitis (Inflammation of the Brain).....	1	
Laryngismus stridulus (False Croup).....	1	
Meningitis.....	7	
Paralysis (Palsy).....	2	
ORDER 2—Circulatory.		
Embolismus (Embolism)...	2	
Endocarditis (Inflammation of Membrane lining Heart).....	1	
ORDER 3—Respiratory.		
Bronchitis (Bronchitis).....	7	
Laryngitis (Inflammation of Larynx).....	1	
Pleuritis (Pleurisy).....	1	
Pleuro-Pneumonia (Pleurisy and inflammation of Lungs).....	5	
Pneumonia (Inflammation of Lung).....	12	
Other Diseases of the Respiratory System (Edema Lungs).....	3	
ORDER 4—Digestive.		
Enteritis (Inflammation of Bowels).....	3	
Hernia (Rupture).....	1	
Peritonitis (Inflammation of Abdomen).....	1	
Ulcer stomachi (Ulcer of Stomach).....	1	
ORDER 5—Urinary.		
Nephria (Bright's Disease) 1		
ORDER 6—Generative.		
Tumor uteri (Uterine Tumor).....	1	
CLASS IV—Developmental.		
ORDER 1—Children.		
Partus emortuus (Still-Birth).....	9	
Partus intempestivus (Premature Birth).....	5	
ORDER 2—Women.		
Febris puerperalis (Puerperal Fever).....	2	
ORDER 3—Old Age.		
Senectus (Old Age).....	2	
ORDER 4—Nutrition.		
Debilitas (Debility).....	6	
CLASS V—Violence.		
ORDER 1—Accident.		
Ambusta (Burns and Scalds).....	1	
Gelatio (Freezing).....	1	
Venenatio (Poisoning by—)	1	
R. R. Accident.....	1	
ORDER 4—Suicide.		
Vulner (Wounds).....	1	
Total, (without still births and premature births) 163.		Being 13.2 per thousand of population per year.

SEX.

Adults—Male.....	27	Total Females.....	81
Adults—Female.....	23	Total Adults.....	50
Minors—Male.....	55	Total Minors.....	113
Minors—Female.....	58		
Total—Males.....	82	Grand Total.....	163

COMPARATIVE MONTHLY MORTALITY.

Corresponding month in 1878.....	150	Corresponding month in 1876.....	120
Corresponding month in 1877.....	221		

JANUARY—Continued.

AGE.

	S.	M.	W.	T'l.		S.	M.	W.	T'l.
Males under 1 year.....	23	--	--	23	Females, under 1 year..	25	--	--	25
" from 1 to 5.....	17	--	--	17	" from 1 to 5.....	23	--	--	23
" from 5 to 20.....	15	--	--	15	" from 5 to 20.....	10	--	--	10
" from 20 to 30.....	2	2	--	4	" from 20 to 30.....	2	4	--	6
" from 30 to 40.....	2	1	--	3	" from 30 to 40.....	--	7	--	7
" from 40 to 50.....	1	2	--	3	" from 40 to 50.....	--	2	--	2
" from 50 to 60.....	1	5	--	6	" from 50 to 60.....	2	1	--	3
" from 60 to 70.....	2	4	--	6	" from 60 to 70.....	--	2	--	2
" from 70 to 80.....	--	2	2	4	" from 70 to 80.....	--	1	--	1
" over 80 years.....	--	1	--	1	" over 80 years.....	--	1	1	2
Total—Males.....	63	17	2	82	Total—Females.....	62	18	1	81
					Grand Total.....				163

NATIVITIES.

Milwaukee.....108	France.....	Denmark.....
Wisconsin.....5	Russia.....	Austria.....
Other States.....7	Poland.....	Netherlands.....
Germany.....26	Switzerland.....	Not given.....
Ireland.....7	Bohemia.....1	Italy.....
England.....3	Hungary.....1	China.....
Scotland.....2	Holland.....	
Wales.....	Norway.....2	Total.....163
Canada.....1	Sweden.....	

CEMETERIES WHERE INTERRED.

Almshouse Farm.....1	National Home.....	Elsewhere.....8
Calvary.....38	Spring Hill.....	
Forest Home.....62	Trinity.....15	Total.....163
Greenwood.....2	Union.....37	

LOCALITIES.

First Ward.....10	Ninth Ward.....7	St. Vincent's Infant Asy- lum (5th Ward).....2
Second Ward.....16	Tenth Ward.....13	Alms House.....1
Third Ward.....9	Eleventh Ward.....18	South Side Police Station 1
Fourth Ward.....15	Twelfth Ward.....20	
Fifth Ward.....14	Thirteenth Ward.....8	Total.....163
Sixth Ward.....11	St. Mary's Hospital(1st Ward).....1	
Seventh Ward.....6		
Eighth Ward.....11		

DAILY MORTALITY.

1st.....8	12th.....6	23d.....4
2d.....7	13th.....1	24th.....3
3d.....9	14th.....3	25th.....4
4th.....5	15th.....1	26th.....6
5th.....7	16th.....10	27th.....5
6th.....6	17th.....2	28th.....3
7th.....6	18th.....11	29th.....3
8th.....5	19th.....4	30th.....1
9th.....9	20th.....7	31st.....5
10th.....3	21st.....4	
11th.....8	22d.....7	Total.....163

MONTHLY REPORT OF DEATHS

FOR

FEBRUARY, 1879.

CAUSES OF DEATH.

CLASS I—Zymotic.		CLASS III—Local.		CLASS IV—Developmental.	
ORDER 1—Miasmatic.		ORDER 1—Nervous.		ORDER 1—Children.	
Cynanche trachealis (Mem- branous Croup).....	4	Apoplexia (Apoplexy).....	1	Atelectasis pulmonum (—). 1	
Diphtheria (Diphtheria)....	13	Convulsio (Convulsions)....	25	Partus emortuus (Still- Birth).....	12
Febris cerebro-spinalis (Cer- ebro Spinal Fever).....	2	Encephalitis (Inflammation of the Brain).....	1	Partus intempestivus (Pre- mature Birth).....	7
Scarlatina (Scarlet Fever). 1		Meningitis.....	5	Spina Bifida.....	2
Septicaemia.....	1	Paralysis (Palsy).....	3	ORDER 3—Old Age.	
CLASS II—Constitutional.		ORDER 2—Circulatory.		ORDER 4—Nutrition.	
ORDER 1—Diathetic.		Atrophica cordis (Atrophy of Heart).....		Atrophica (Atrophy).....	
Anæmia (Anæmia).....	1	Hypertrophica cordis (En- largement of Heart)....		Debilitas (Debility).....	
Asthma (Spasmodic Asthma) 1		Morbus valvularum cordis (Valvular disease of Heart).....		CLASS V—Violence.	
Carcinoma (Cancer).....	6	ORDER 3—Respiratory.		ORDER 1—Accident.	
Of Stomach).....	2	Apoplexia pulmonalis (Con- gestion of Lungs).....		Vulnera (Wounds).....	
Of Uterus.....	3	Bronchitis (Bronchitis)....		Railroad Accident.....	
Not Stated.....	2	Laryngitis (Inflammation of Larynx).....		ORDER 4—Suicide.	
Hydrops (Dropsy).....	1	Pleuritis (Pleurisy).....		Vulnera (Wounds).....	
ORDER 2—Tubercular.		Pneumonia (Inflammation of Lungs).....			
Hydrocephalus.....	1	ORDER 4—Digestive.			
Meningitis tuberculosa (Tu- bercular Meningitis).....	1	Enteritis (Inflammation of Bowels).....			
Peritonitis tuberculosa (Tu- bercular Peritonitis).....	1				
Phthisis pulmonalis (Con- sumption).....	12				
Tabes Mesenterica (Maras- mus).....	6				
Tuberculosis.....	1				

Total, (without Still-Births and Premature Births) 147, or 11.9 per thousand of Population per year.

SEX.

Adults—Males.....	24	Total Females.....	85
Adults—Females.....	26	Total Adults.....	50
Minors—Males.....	38	Total Minors.....	97
Minors—Females.....	59		
Total Males.....	62	Grand Total.....	147

COMPARATIVE MONTHLY MORTALITY.

Corresponding month in 1878.....	155	Corresponding month in 1876.....	140
Corresponding month in 1877.....	192		

FEBRUARY—Continued.

AGE.

	S.	M.	W.	T'l.		S.	M.	W.	T'l.
Males under 1 year.....	20	..	..	20	Females under 1 year.....	22	..	..	22
" from 1 to 5.....	12	..	..	12	" from 1 to 5.....	29	..	..	29
" from 5 to 20.....	6	..	..	6	" from 5 to 20.....	8	..	..	8
" from 20 to 30.....	1	2	..	3	" from 20 to 30.....	..	..	..	..
" from 30 to 40.....	..	4	..	4	" from 30 to 40.....	..	1	..	1
" from 40 to 50.....	..	4	1	5	" from 40 to 50.....	..	4	1	5
" from 50 to 60.....	..	1	..	1	" from 50 to 60.....	1	5	..	6
" from 60 to 70.....	..	3	2	5	" from 60 to 70.....	1	5	..	6
" from 70 to 80.....	1	2	1	4	" from 70 to 80.....	1	4	1	6
" over 80 years.....	..	1	1	2	" over 80 years.....	..	2	..	2
Total—Males.....	40	17	5	62	Total—Females.....	62	21	3	85
					Grand Total.....				147

NATIVITIES.

Milwaukee.....	90	France.....	..	Denmark.....	..
Wisconsin.....	4	Russia.....	..	Austria.....	..
Other States.....	10	Poland.....	..	Netherlands.....	..
Germany.....	32	Switzerland.....	1	Not Given.....	..
Ireland.....	5	Bohemia.....	..	Italy.....	..
England.....	2	Hungary.....	..	China.....	..
Scotland.....	2	Holland.....	..		
Wales.....	..	Norway.....	1	Total.....	147
Canada.....	..	Sweden.....	..		

CEMETERIES WHERE INTERRED.

Almshouse Farm.....	1	National Home.....	..	Elsewhere.....	5
Calvary.....	36	Spring Hill.....	..	Total.....	147
Forest Home.....	48	Trinity.....	9		
Greenwood.....	..	Union.....	48		

LOCALITIES.

First Ward.....	14	Ninth Ward.....	13	St. Vincent's Infant Asy-	..
Second Ward.....	21	Tenth Ward.....	11	lum, (5 Ward).....	1
Third Ward.....	10	Eleventh Ward.....	14	Asylum Little Sisters	..
Fourth Ward.....	13	Twelfth Ward.....	3	Poor, (4th Ward).....	1
Fifth Ward.....	13	Thirteenth Ward.....	4	Total.....	147
Sixth Ward.....	12	St. Mary's Hospital (1st	..		
Seventh Ward.....	4	Ward.....	1		
Eighth Ward.....	12				

DAILY MORTALITY.

1st.....	2	12th.....	6	23d.....	6
2d.....	5	13th.....	5	24th.....	4
3d.....	3	14th.....	8	25th.....	4
4th.....	9	15th.....	4	26th.....	11
5th.....	5	16th.....	6	27th.....	4
6th.....	3	17th.....	6	28th.....	7
7th.....	5	18th.....	9		
8th.....	6	19th.....	3		
9th.....	6	20th.....	4		
10th.....	6	21st.....	4		
11th.....	3	22d.....	3	Total.....	147

MONTHLY REPORT OF DEATHS

FOR

MARCH, 1879.

CAUSES OF DEATH.

CLASS I—Zymotic.		CLASS III—Local.		Peritonitis (Inflammation of Abdomen)	
ORDER 1— <i>Miasmatic</i> .		ORDER 1— <i>Nervous</i> .		Ulcer stomachi (Ulcer of Stomach)	
Cynanche trachealis (Membranous Croup).....	8	Apoplexia (Apoplexy).....	2	ORDER 5— <i>Urinary</i> .	
Diarrhœa acuta (Acute Diarrhœa)	1	Convulsio (Convulsions).....	32	Nephria (Bright's Disease) ..	
Diphtheria (Diphtheria).....	16	Encephalitis (Inflammation of the Brain).....	4	ORDER 6— <i>Generative</i> .	
Erysipelas (Erysipelas).....	1	Epilepsia (Epilepsy).....	1	Metritis (Inflammation of Womb)	
Febris cerebro-spinalis (Cerebro Spinal Fever).....	1	Meningitis	6	CLASS IV—Developmental.	
Febris remittens (Remittent Fever).....	2	Myelitis (Inflammation of Spinal Cord).....	1	ORDER 1— <i>Children</i> .	
Febris typhoides (Typhoid Fever).....	1	Necrencephalus (Softening of Brain).....	1	Atelectasis pulmonum (—).....	
Febris typhus (Typhus Fever).....	3	Tetanus (Lockjaw).....	2	Cyanosis.....	
Febris typhus (Typhus Fever).....	1	ORDER 2— <i>Circulatory</i> .		Partus emortuus (Still Birth).....	
Pertussis (Whooping Cough).....	4	Angina pectoris (Breast Pang).....	1	Partus intempestivus (Premature Birth).....	
Pyæmia (Pyæmia).....	1	Carditis (Inflammation of Heart).....	1	ORDER 2— <i>Women</i> .	
CLASS II—Constitutional.		Pericarditis (Inflammation of membrane covering Heart).....	2	Eclampsia parturi (Convulsions in Childbirth).....	
ORDER — <i>Diathetic</i> .		ORDER 3— <i>Respiratory</i> .		Hæmorrhagia post partum (Flooding).....	
Anasarca (General Dropsy).....	1	Apoplexia pulmonalis (Congestion of Lungs).....	3	ORDER 3— <i>Old Age</i> .	
Asthma (Spasmodic Asthma)	1	Brouchitis (Bronchitis).....	8	Senectus (Old Age).....	
Carcinoma (Cancer).....	5	Empyema.....	1	—(Senile Debility).....	
Of Stomach.....	1	Laryngitis (Inflammation of Larynx).....	1	ORDER 4— <i>Nutrition</i> .	
Of Uterus.....	3	Pleuritis (Pleurisy).....	1	Atrophia (Atrophy).....	
Not stated.....	1	Pneumonia (Inflammation of Lung).....	18	Debilitas (Debility).....	
Hydrops (Dropsy).....	2	(Edema Lungs).....	1	CLASS V—Violence.	
Peritonitis tuberculosus (Tubercular Peritonitis).....	2	ORDER 4— <i>Digestive</i> .		ORDER 1— <i>Accident</i> .	
Phthisis pulmonalis (Consumption).....	23	Ascites (Abdominal Dropsy).....	2	Fractura (Fracture).....	
Scrofula (Scrofula).....	1	Dyspepsia (Indigestion).....	1	Suffocatio (Suffocation)	
Tabes Mesenterica (Marasmus).....	1	Enteritis (Inflammation of Bowels).....	3	Vulnera (Wounds).....	
		Gastritis (Inflammation of Stomach).....	1		
		Hernia (Rupture).....	1		

Total, (without still births and premature births) 186 or 15 per thousand of population per year.

SEX.

Adults—Male.....	31	Total Females.....	89
Adults—Female.....	28	Total Adults.....	59
Minors—Male.....	66	Total Minors.....	127
Minors—Female.....	61		
Total Males.....	97	Grand Total.....	186

COMPARATIVE MONTHLY STATEMENT.

Corresponding month in 1878	163	Corresponding month in 1876	179
Corresponding month in 1877	217		

MARCH—Continued.

AGE.

	S.	M.	W.	T'l.		S.	M.	W.	T'l.
Males, under 1 year.....	33	--	--	33	Females, under 1 year....	29	--	--	29
" from 1 to 5.....	20	--	--	20	" from 1 to 5.....	22	--	--	22
" from 5 to 20.....	13	--	--	13	" from 5 to 20.....	10	--	--	10
" from 10 to 30.....	7	--	--	7	" from 20 to 30.....	3	5	--	8
" from 30 to 40.....	2	5	--	7	" from 30 to 40.....	--	2	--	2
" from 40 to 50.....	1	1	--	2	" from 40 to 50.....	1	2	1	4
" from 50 to 60.....	--	4	--	4	" from 50 to 60.....	--	2	1	3
" from 60 to 70.....	--	5	1	6	" from 60 to 70.....	--	5	1	6
" from 70 to 80.....	1	2	--	3	" from 70 to 80.....	1	3	1	5
" over 80 years.....	--	1	1	2	" over 80 years.....	--	--	--	--
Total—Males.....	77	18	2	97	Total—Females.....	66	19	4	89
					Grand Total.....				186

NATIVITIES.

Milwaukee.....	120	France.....	--	Denmark.....	--
Wisconsin.....	7	Russia.....	--	Austria.....	1
Other States.....	11	Poland.....	--	Netherlands.....	2
Germany.....	33	Switzerland.....	2	Not Given.....	--
Ireland.....	6	Bohemia.....	2	Italy.....	--
England.....	1	Hungary.....	--	China.....	--
Scotland.....	--	Holland.....	--		
Wales.....	--	Norway.....	1	Total.....	186
Canada.....	2	Sweden.....	--		

CEMETERIES WHERE INTERRED.

Almshouse Farm.....	1	National Home.....	--	Elsewhere.....	9
Calvary.....	47	Spring Hill.....	1		
Forest Home.....	41	Trinity.....	24	Total.....	186
Greenwood.....	3	Union.....	60		

LOCALITIES.

First Ward.....	11	Ninth Ward.....	22	(5th Ward.....	3
Second Ward.....	13	Tenth Ward.....	15	Milwaukee Hospital (2nd	
Third Ward.....	13	Eleventh Ward.....	22	Ward).....	1
Fourth Ward.....	18	Twelfth Ward.....	8	Alms House, Wauwatosa..	1
Fifth Ward.....	14	Thirteenth Ward.....	10		
Sixth Ward.....	9	St. Mary's Hospital (1st		Total.....	186
Seventh Ward.....	10	Ward).....	3		
Eighth Ward.....	13	St. Vincent's Infant Asylum			

DAILY MORTALITY.

1st.....	5	12th.....	8	23d.....	7
2d.....	4	13th.....	10	24th.....	5
3d.....	5	14th.....	3	25th.....	6
4th.....	2	15th.....	9	26th.....	8
5th.....	10	16th.....	8	27th.....	4
6th.....	8	17th.....	7	28th.....	8
7th.....	7	18th.....	7	29th.....	7
8th.....	3	19th.....	6	30th.....	4
9th.....	5	20th.....	5	31st.....	7
10th.....	6	21st.....	4		
11th.....	5	22d.....	3	Total.....	186

MONTHLY REPORT OF DEATHS

FOR
APRIL, 1879.

CAUSES OF DEATHS.

CLASS I—Zymotic.		Encephalitis (Inflammation of Brain).....	3	ORDER 6—Generative.	
ORDER 1—Miasmatic.		Meningitis.....	5	Morbus uteri (Uterine Disease).....	
Cynanche trachealis (Membranous Croup).....		ORDER 2—Circulatory.		CLASS IV—Developmental.	
Diphtheria (Diphtheria)....		Carditis (Inflammation of Heart).....	2	ORDER 1—Children.	
Erysipelas (Erysipelas)....		Hypertrophia cordis (Enlargement of Heart)....	1	Partus emortuus (Still-Birth).....	
Febris typhoides (Typhoid Fever).....		Morbus valvularum cordis (Valvular disease of Heart).....	3	Partus intempestivus (Premature Birth).....	
Febris typhus (Typhus Fever).....		Apoplexia pulmonalis (Congestion of Lungs).....	1	ORDER 2—Women.	
Pyæmia (Pyæmia).....		Bronchitis (Bronchitis)....	9	Eclampsia parturi (Convulsions in Childbirth)....	
Scarlatina (Scarlet Fever)....		Emphysema.....	1	Febris puerperalis (Puerperal Fever).....	
Tonsillitis (Quinsy).....		Pleuritis (Pleurisy).....	1	ORDER 3—Old Age.	
ORDER 2—Euthetic.		Pleuro-Pneumonia (Pleurisy and Inflammation of Lungs).....	1	—(Senile Debility).....	
Hydrophobia (Hydrophobia)....		Pneumonia (Inflammation of Lungs).....	10	ORDER 4—Nutrition.	
CLASS II—Constitutional.		Tuberculosis.....	1	Atrophia (Atrophy).....	
ORDER 1—Diathetic.		ORDER 4—Digestive.	1	Debilitas (Debility).....	
Anæmia (Anæmia).....		Cirrhosis (—).....	1	CLASS V—Violence.	
Carcinoma (Cancer).....		Enteritis (Inflammation of Bowels).....	1	ORDER 1—Accident.	
Of Bladder.....		Gastritis (Inflammation of Stomach).....	2	Concussio (Concussion)....	
Of Uterus.....		Hepatitis (Inflammation of Liver).....	1	Fractura (Fracture).....	
Hydrops (Dropsy).....		Peritonitis (Inflammation of Abdomen).....	1	Submersio (Drowning)....	
ORDER 2—Tubercular.		ORDER 5—Urinary.	1	ORDER 4—Suicide.	
Phthisis pulmonalis (Consumption).....		Hamaturia (Bloody Urine)....	1	Suspendium (Hanging)....	
Tabes Mesenterica (Marasmus).....		Nephritis (Inflammation of Kidney).....	1	Venenatio (Poisoning).....	
CLASS III—Local.				Vulnera (Wounds).....	
ORDER 1—Nervous.					
Apoplexia (Apoplexy).....					
Convulsio (Convulsions)....					

Total, (without Still-Births and Premature Births) 165, or 16 per thousand of population per year.

SEX.

Adults—Male.....	38	Total Females.....	67
Adults—Females.....	20	Total Adults.....	58
Minors—Males.....	60	Total Minors.....	107
Minors—Females.....	47		
Total Males.....	98	Grand Total.....	165

COMPARATIVE MONTHLY MORTALITY.

Corresponding month in 1878.....	142	Corresponding month in 1876.....	150
Corresponding month in 1877.....	159		

APRIL, 1879.

AGE.

	S.	M.	W.	Tl.		S.	M.	W.	Tl.
Males under 1 year.....	35			35	Females under 1 year....	17			17
“ from 1 to 5.....	17			17	“ from 1 to 5.....	20			20
“ from 5 to 20.....	8			8	“ from 5 to 20....	7	2		9
“ from 20 to 30.....	4	4		8	“ from 20 to 30....	2	2	1	5
“ from 30 to 40.....		4		5	“ from 30 to 40....		5		5
“ from 40 to 50.....		5		6	“ from 40 to 50....		1		1
“ from 50 to 60.....			1	8	“ from 50 to 60....		2	1	3
“ from 60 to 70.....		6		6	“ from 60 to 70....	1	2		3
“ from 70 to 80.....				2	“ from 70 to 80....		1	2	3
“ over 80 years.....				3	“ over 80 years....		1		1
Total—Males.....	69	28	1	98	Total—Females.....	47	16	4	67
					Grand Total.....				165

NATIVITIES.

Milwaukee.....105	France.....	Denmark.....
Wisconsin.....4	Russia.....	Austria.....
Other States.....8	Poland.....	Netherlands.....
Germany.....35	Switzerland.....	Not Given.....
Ireland.....4	Bohemia.....3	Italy.....
England.....4	Hungary.....	China.....
Scotland.....	Holland.....1	
Wales.....	Norway.....1	Total.....165
Canada.....	Sweden.....	

CEMETERIES WHERE INTERRED.

Almshouse Farm.....	National Home.....	Elsewhere.....6
Calvary.....33	Spring Hill.....2	
Forest Home.....51	Trinity.....17	Total.....165
Greenwood.....	Union.....56	

LOCALITIES

First Ward.....8	Ninth ward.....10	Morgue (7th ward).....1
Second Ward.....18	Tenth ward.....18	
Third Ward.....9	Eleventh ward.....17	Total.....165
Fourth Ward.....20	Twelfth ward.....8	
Fifth Ward.....13	Thirteenth ward.....6	
Sixth Ward.....12	St. Vincent's Infant Asy- lum (11th ward).....3	
Seventh ward.....11		
Eighth ward.....11		

DAILY MORTALITY.

1st.....2	12th.....6	23d.....8
2d.....8	13th.....2	24th.....7
3d.....5	14th.....2	25th.....7
4th.....4	15th.....2	26th.....7
5th.....4	16th.....3	27th.....6
6th.....8	17th.....5	28th.....3
7th.....9	18th.....3	29th.....6
8th.....7	19th.....10	30th.....4
9th.....9	20th.....5	31st.....
10th.....4	21st.....6	
11th.....4	22d.....9	Total.....165

MONTHLY REPORT OF DEATHS

FOR

MAY 1879.

CAUSES OF DEATH.

CLASS I—Zymotic.					
ORDER 1—Miasmatic.					
Cholera Infantum.....	2	Convulsio (Convulsions)...	16	ORDER 5—Urinary.	
Cynanche trachealis (Mem-		Encephalitis (Inflammation		Cystitis (Inflammation of	
branous Croup).....	7	of the Brain).....	1	Bladder).....	1
Diarrhoea acuta (Acute Di-		Hemiplegia (Paralysis of one		Nephria (Bright's Disease)	3
errhoea).....	2	side of the Body).....	1	ORDER 7—Locomotive.	
Dysentery acuta (Acute		Meningitis.....	3	Necrosis (—).....	1
Dysentery).....	1	Myelitis (Inflammation of		CLASS IV—Developmental.	
Diphtheria (Diphtheria)...	17	Spinal Cord).....	1	ORDER 1—Children.	
Febris biliosa (Bilious Fever)		Necrencephalus (Softening		Cyanosis.....	1
Febris cerebro-spinalis (Cer-		of Brain).....	1	Partus emortuus (Still-	
ebro Spinal Fever).....	1	Paralysis (Palsy).....	2	Birth).....	14
Febris typhoides (Typhoid		ORDER 2—Circulatory.		Partus intempestivus (Pre-	
Fever).....	1	Embolismus (Embolism)...	1	mature Birth).....	5
Pertussis (Whooping		Pericarditis (Inflammation		ORDER 2—Women.	
Cough).....	2	of membrane covering		Febris puerperalis (Puer-	
Pyæmia (Pyæmia).....	2	Heart).....	1	peral Fever).....	4
Scarlatina (Scarlet Fever).		ORDER 3—Respiratory.		ORDER 3—Old Age.	
Other Miasmatic Diseases.	1	Apoplexia pulmonalis (Con-		Senectus (Old Age).....	2
CLASS II—Constitutional.		gestion of Lungs).....	2	ORDER 4—Nutrition	
ORDER 1—Diathetic.		Bronchitis (Bronchitis)...	4	Debilitas (Debility).....	7
Carcinoma (Cancer).....	2	Gangræna pulmonum (Gan-		CLASS V—Violence.	
Of Stomach.....	2	grene of Lungs).....	1	ORDER 1—Accident.	
ORDER 2—Tubercular.		Laryngitis (Inflammation of		Concussio (Concussion)...	1
Meningitis tuberculosis (Tu-		Larynx).....	2	Contusio (Contusion).....	1
bercular Meningitis).....	1	Pneumonia (Inflammation		Fractura (Fracture).....	1
Phthisis pulmonalis (Con-		of Lung).....	4	Submersio (Drowning)....	2
sumption).....	16	Tuberculosis.....	1		
Scrofula (Scrofula).....	2	ORDER 4—Digestive.			
CLASS III—Local.		Ascites (Abdominal Dropsy)	1		
ORDER 1—Nervous.		Chololithus (Gallstones)...	1		
Apoplexia (Apoplexy).....	1	Cirrhosis (—).....	1		
		Hepatitis (Inflammation of			
		Liver).....	2		
		Peritonitis (Inflammation of			
		Abdomen).....	2		

Total, (without still births and premature births) 130. Being 10.5 per thousand of population per year.

SEX.

Adults—Male.....	32	Total Females.....	54
Adults—Female.....	23	Total Adults.....	55
Minors—Male.....	44	Total Minors.....	75
Minors—Female.....	31		
Total—Males.....	76	Grand Total.....	130

COMPARATIVE MONTHLY MORTALITY.

Corresponding month in 1878.....	113	Corresponding month in 1876.....	152
Corresponding month in 1877.....	195		

MAY—Continued.

AGE.

	S.	M.	W.	T'l.		S.	M.	W.	T'l.
Males under 1 year.....	20	..	..	20	Females, under 1 year..	11	..	..	11
" from 1 to 5.....	15	..	..	15	" from 1 to 5....	12	..	..	12
" from 5 to 20.....	9	..	..	9	" from 5 to 20....	7	1	..	8
" from 20 to 30.....	4	1	..	5	" from 20 to 30..	4	3	..	7
" from 30 to 40.....	2	2	..	4	" from 30 to 40..	1	2	..	3
" from 40 to 50.....	..	1	..	1	" from 40 to 50..	1	3	..	4
" from 50 to 60.....	2	8	2	12	" from 50 to 60..	..	5	..	5
" from 60 to 70.....	1	6	..	7	" from 60 to 70..	..	..	2	2
" from 70 to 80.....	..	2	..	2	" from 70 to 80..	..	..	2	2
" over 80 years.....	..	1	..	1	" over 80 years..	..	..	..	..
Total—Males.....	53	21	2	76	Total—Females....	36	14	4	54
					Grand Total.....				130

NATIVITIES.

Milwaukee.....	55	France.....	1	Denmark.....	..
Wisconsin.....	4	Russia.....	..	Austria.....	..
Other States.....	15	Poland.....	..	Netherlands.....	..
Germany.....	32	Switzerland.....	..	Not given.....	2
Ireland.....	7	Bohemia.....	..	Italy.....	..
England.....	1	Hungary.....	..	China.....	..
Scotland.....	1	Holland.....	..	Total.....	130
Wales.....	..	Norway.....	1		
Canada.....	1	Sweden.....	..		

CEMETERIES WHERE INTERRED.

Almshouse Farm.....	..	National Home.....	..	Elsewhere.....	8
Calvary.....	34	Spring Hill.....	2	Total.....	130
Forest Home.....	28	Trinity.....	22		
Greenwood.....	..	Union.....	36		

LOCALITIES.

First Ward.....	13	Ninth Ward.....	11	Milwaukee Hospital (2d	
Second Ward.....	10	Tenth Ward.....	8	Ward).....	1
Third Ward.....	9	Eleventh Ward.....	20	Asylum Little Sisters	
Fourth Ward.....	12	Twelfth Ward.....	9	(Poor 1st ward).....	1
Fifth Ward.....	9	Thirteenth Ward.....	5	Total.....	130
Sixth Ward.....	8	St. Vincent's Infant Asy-			
Seventh Ward.....	7	lum (5th Ward).....	1		
Eighth Ward.....	6				

DAILY MORTALITY.

1st.....	3	12th.....	5	23d.....	2
2d.....	7	13th.....	6	24th.....	..
3d.....	5	14th.....	4	25th.....	9
4th.....	6	15th.....	4	26th.....	4
5th.....	3	16th.....	5	27th.....	2
6th.....	3	17th.....	2	28th.....	5
7th.....	4	18th.....	3	29th.....	6
8th.....	8	19th.....	6	30th.....	3
9th.....	3	20th.....	2	31st.....	1
10th.....	3	21st.....	8	Total.....	130
11th.....	5	22d.....	3		

MONTHLY REPORT OF DEATHS

FOR

JUNE, 1879.

CAUSES OF DEATH.

CLASS I Zymotic.	CLASS III Local.	ORDER 6- Generative.
ORDER 1- Miasmatic.	ORDER 1- Nervous.	Metritis (Inflammation of Womb)..... 1
Cholera Infantum..... 2	Apoplexia (Apoplexy)..... 1	Tumor uteri (Uterine Tumor)..... 1
Cynanche trachealis (Membranous Croup)..... 5	Convulsio (Convulsions)..... 12	CLASS IV- Developmental.
Diarrhoea Acute (Acute Diarrhoea)..... 1	Encephalitis (Inflammation of the Brain)..... 1	ORDER 1-Children.
Dysentery acuta (Acute Dysentery)..... 1	Meningitis..... 4	Cyanosis..... 3
Diphtheria (Diphtheria)..... 10	Neerencephalus (Softening of Brain)..... 2	Natus Præter Naturam (Prematural Birth)..... 1
Erysipelas (Erysipelas)..... 1	Paralysis (Palsy)..... 1	Partus emortuus (Still-Birth)..... 12
Febbris cerebri spinalis (Cerebro Spinal Fever)..... 1	ORDER 2- Circulatory.	Partus intempestivus (Premature Birth)..... 2
Febbris typhoides (Typhoid Fever)..... 1	Degeneratio cordis (Fatty Degeneration of Heart)..... 1	Spina Bifida..... 1
Pertussis (Whooping Cough)..... 1	Embolismus (Embolism)..... 1	ORDER 2- Women.
Pyæmia (Pyæmia)..... 1	Pericarditis (Inflammation of membrane covering Heart)..... 1	Phlegmasia dolens (Milk Leg)..... 1
Scarlatina (Scarlet Fever)..... 1	ORDER 3- Respiratory.	ORDER 3-Old Age.
CLASS II- Constitutional.	Bronchitis (Bronchitis)..... 2	Senectus (Old Age)..... 1
ORDER 1- Diathetic.	Laryngitis (Inflammation of Larynx)..... 1	—(Senile Debility)..... 1
Asthma (Spasmodic Asthma)..... 1	Pneumonia (Inflammation of Lungs)..... 13	ORDER 4- Nutrition.
Carcinoma (Cancer)..... 5	ORDER 4- Digestive.	Atrophia (Atrophy)..... 1
Of Stomach)..... 4	Cirrhosis (.....)..... 1	Debilitas (Debility)..... 7
Of Uterus)..... 1	Enteritis (Inflammation of Bowels)..... 2	CLASS V- Violence.
Gangrena senilis (Dry Gangrene)..... 1	Gastritis (Inflammation of Stomach)..... 2	ORDER 1- Accident.
Rheumatismus (Rheumatism)..... 1	Peritonitis (Inflammation of Abdomen)..... 1	Submersio (Drowning)..... 3
ORDER 2- Tubercular.	ORDER 5- Urinary.	A fall from building..... 1
Phthisis pulmonalis (Consumption)..... 19	Nephia (Bright's Disease)..... 1	Railroad Accident..... 3
Scrofula (Scrofula)..... 3		ORDER 4- Suicide.
Tabes Mesenterica (Marasmus)..... 2		Venenatio (Poisoning)..... 1
		Vulnera (Wounds)..... 1

Total, (without Still-Births and Premature Births) 136, being 13.2 per thousand of Population per year.

SEX.

Adults—Males..... 27	Total Females..... 61
Adults—Females..... 27	Total Adults..... 54
Minors—Males..... 48	Total Minors..... 82
Minors—Females..... 34	
Total Males..... 75	Grand Total..... 136

COMPARATIVE MONTHLY MORTALITY.

Corresponding month in 1878..... 106	Corresponding month in 1876..... 145
Corresponding month in 1877..... 159	

JUNE—Continued.

AGE.

	S.	M.	W.	Tl.		S.	M.	W.	Tl.
Males under 1 year.....	30			30	Females under 1 year.....	11			11
“ from 1 to 5.....	7			7	“ from 1 to 5.....	11			11
“ from 5 to 20.....	11			11	“ from 5 to 20.....	12			12
“ from 20 to 30.....	1	3		4	“ from 20 to 30.....	4	4		8
“ from 30 to 40.....	1			1	“ from 30 to 40.....	2	6		8
“ from 40 to 50.....	1			1	“ from 40 to 50.....	1	1		2
“ from 50 to 60.....	1			1	“ from 50 to 60.....	1	5		6
“ from 60 to 70.....	3	3		6	“ from 60 to 70.....	3	1	4	8
“ from 70 to 80.....	3	3		6	“ from 70 to 80.....	1	1	2	4
“ over 80 years.....	1	1		2	“ over 80 years.....	2	2	2	6
Total—Males.....	51	23	1	75	Total—Females.....	37	20	4	61
					Grand Total.....				136

NATIVITIES.

Milwaukee.....	76	France.....	..	Denmark.....	..
Wisconsin.....	5	Russia.....	..	Austria.....	..
Other States.....	12	Poland.....	3	Netherlands.....	..
Germany.....	27	Switzerland.....	1	Not Given.....	1
Ireland.....	7	Bohemia.....	3	Italy.....	..
England.....	1	Hungary.....	..	China.....	..
Scotland.....	..	Holland.....	..		
Wales.....	..	Norway.....	..	Total.....	136
Canada.....	..	Sweden.....	..		

CEMETERIES WHERE INTERRED.

Almshouse Farm.....	1	National Home.....	..	Elsewhere.....	1
Calvary.....	36	Spring Hill.....	..	Total.....	136
Forest Home.....	36	Trinity.....	13		
Greenwood.....	..	Union.....	49		

LOCALITIES.

First Ward.....	10	Ninth Ward.....	19	St. Vincent's Infant Asy-	
Second Ward.....	13	Tenth Ward.....	15	lum, (11th Ward).....	4
Third Ward.....	8	Eleventh Ward.....	13	Asylum Little Sisters	
Fourth Ward.....	17	Twelfth Ward.....	3	Poor, (4th Ward).....	1
Fifth Ward.....	6	Thirteenth Ward.....	3	Total.....	136
Sixth Ward.....	6	St. Mary's Hospital (1st			
Seventh Ward.....	6	Ward.....	2		
Eighth Ward.....	10				

DAILY MORTALITY.

1st.....	2	12th.....	5	23d.....	5
2d.....	7	13th.....	5	24th.....	6
3d.....	7	14th.....	3	25th.....	6
4th.....	5	15th.....	1	26th.....	6
5th.....	7	16th.....	6	27th.....	3
6th.....	2	17th.....	3	28th.....	3
7th.....	5	18th.....	3	29th.....	5
8th.....	5	19th.....	4	30th.....	3
9th.....	8	20th.....	5	21st.....	..
10th.....	4	21st.....	7		
11th.....	2	22d.....	3	Total.....	136

MONTHLY REPORT OF DEATHS

FOR

JUNE, 1879.

CAUSES OF DEATH.

CLASS I—Zymotic.	CLASS III—Local.	ORDER 6—Generative.
ORDER 1—Miasmatic.	ORDER 1—Nervous.	Metritis (Inflammation of Womb)..... 1
Cholera Infantum..... 2	Apoplexia (Apoplexy)..... 3	Tumor uteri (Uterine Tumor) 1
Cynanche trachealis (Membranaceous Croup)..... 5	Convulsio (Convulsions).... 12	CLASS IV—Developmental.
Diarrhoea Acute (Acute Diarrhoea)..... 1	Encephalitis (Inflammation of the Brain)..... 1	ORDER 1—Children.
Dysentery acuta (Acute Dysentery)..... 4	Meningitis..... 4	2 Cyanosis..... 3
Dysentery..... 10	Necrencephalus (Softening of Brain)..... 2	2 Natus Præter Naturam (Premature Birth)..... 1
Diphtheria (Diphtheria).... 1	Paralysis (Palsy)..... 1	Partus emortuus (Still-Birth)..... 12
Erysipelas (Erysipelas).... 1	ORDER 2—Circulatory.	Partus intempestivus (Premature Birth)..... 2
Febris cerebro-spinalis (Cerebro Spinal Fever)..... 1	Degeneratio cordis (Fatty Degeneration of Heart).... 1	Spina Bifida..... 1
Febris typhoides (Typhoid Fever)..... 1	Embolismus (Embolism).... 1	ORDER 2—Women.
Pertussis (Whooping Cough)..... 1	Pericarditis (Inflammation of membrane covering Heart)..... 1	1 Phlegmasia dolens (Milk Leg)..... 1
Pyæmia (Pyæmia)..... 1	ORDER 3—Respiratory.	ORDER 3—Old Age.
Scarlatina (Scarlet Fever).... 1	Bronchitis (Bronchitis).... 2	Senectus (Old Age)..... 1
CLASS II—Constitutional.	Laryngitis (Inflammation of Larynx)..... 1	—(Senile Debility)..... 1
ORDER 1—Diathetic.	Pneumonia (Inflammation of Lungs)..... 13	ORDER 4—Nutrition.
Asthma (Spasmodic Asthma) 1	ORDER 4—Digestive.	Atrophia (Atrophy)..... 1
Carcinoma (Cancer)..... 5	Cirrhosis (—)..... 1	Debilitas (Debility)..... 7
Of Stomach)..... 4	Enteritis (Inflammation of Bowels)..... 2	CLASS V—Violence.
Of Uterus..... 1	Gastritis (Inflammation of Stomach)..... 2	ORDER 1—Accident.
Gangrena senilis (Dry Gangrene)..... 1	Peritonitis (Inflammation of Abdomen)..... 1	Submersio (Drowning).... 3
Rheumatismus (Rheumatism)..... 1	ORDER 5—Urinary.	A fall from building..... 1
ORDER 2—Tubercular.	Nephia (Bright's Disease). 1	Railroad Accident..... 3
Phthisis pulmonalis (Consumption)..... 19		ORDER 4—Suicide.
Scrofula (Scrofula)..... 3		Venenatio (Poisoning)..... 1
Tabes Mesenterica (Marasmus)..... 2		Vulnera (Wounds)..... 1

Total, (without Still-Births and Premature Births) 136, being 13.2 per thousand of Population per year.

SEX.

Adults—Males..... 27	Total Females..... 61
Adults—Females..... 27	Total Adults..... 54
Minors—Males..... 48	Total Minors..... 82
Minors—Females..... 34	
Total Males..... 75	Grand Total..... 136

COMPARATIVE MONTHLY MORTALITY.

Corresponding month in 1878..... 106	Corresponding month in 1876..... 145
Corresponding month in 1877..... 159	

JUNE—Continued.

AGE.

	S.	M.	W.	T'l.		S.	M.	W.	T'l.
Males under 1 year.....	30	--	--	30	Females under 1 year....	11	--	--	11
" from 1 to 5.....	7	--	--	7	" from 1 to 5.....	11	--	--	11
" from 5 to 20.....	11	--	--	11	" from 5 to 20.....	12	--	--	12
" from 20 to 30.....	1	3	--	4	" from 20 to 30.....	--	4	--	4
" from 30 to 40.....	--	1	--	1	" from 30 to 40.....	2	6	--	8
" from 40 to 50.....	1	3	--	4	" from 40 to 50.....	--	1	--	1
" from 50 to 60.....	1	10	--	11	" from 50 to 60.....	1	5	--	6
" from 60 to 70.....	--	3	--	3	" from 60 to 70.....	--	3	1	4
" from 70 to 80.....	--	3	--	3	" from 70 to 80.....	--	1	1	2
" over 80 years.....	--	--	1	1	" over 80 years.....	--	--	2	2
Total—Males.....	51	23	1	75	Total—Females.....	37	20	4	61
					Grand Total				136

NATIVITIES.

Milwaukee.....	76	France.....	..	Denmark.....	..
Wisconsin.....	5	Russia.....	..	Austria.....	..
Other States.....	12	Poland.....	3	Netherlands.....	..
Germany.....	27	Switzerland.....	1	Not Given.....	1
Ireland.....	7	Bohemia.....	3	Italy.....	..
England.....	1	Hungary.....	..	China.....	..
Scotland.....	..	Holland.....	..		
Wales.....	..	Norway.....	..	Total.....	136
Canada.....	..	Sweden.....	..		

CEMETERIES WHERE INTERRED.

Almshouse Farm.....	1	National Home.....	..	Elsewhere.....	1
Calv ry.....	36	Spring Hill.....	..		
Forest Home.....	36	Trinity.....	13	Total.....	136
Greenwood.....	..	Union.....	49		

LOCALITIES.

First Ward.....	10	Ninth Ward.....	19	St. Vincent's Infant Asy-	
Second Ward.....	13	Tenth Ward.....	15	lum, (11th Ward).....	4
Third Ward.....	8	Eleventh Ward.....	13	Asylum Little Sisters	
Fourth Ward.....	17	Twelfth Ward.....	3	Poor, (4th Ward).....	1
Fifth Ward.....	6	Thirteenth Ward.....	3		
Sixth Ward.....	6	St. Mary's Hospital (1st		Total.....	136
Seventh Ward.....	6	Ward.....	2		
Eighth Ward.....	10				

DAILY MORTALITY.

1st.....	2	12th.....	5	23d.....	5
2d.....	7	13th.....	5	24th.....	6
3d.....	7	14th.....	3	25th.....	6
4th.....	5	15th.....	1	26th.....	6
5th.....	7	16th.....	6	27th.....	3
6th.....	2	17th.....	3	28th.....	3
7th.....	5	18th.....	3	29th.....	5
8th.....	5	19th.....	4	30th.....	3
9th.....	8	20th.....	5	21st.....	..
10th.....	4	21st.....	7		
11th.....	2	22d.....	3	Total.....	136

MONTHLY REPORT OF DEATHS

FOR
JULY, 1879.

CAUSES OF DEATH.

CLASS I—Zymotic.		CLASS III—Local.		Ulcus stomachi (Ulcer of Stomach)..... 1	
ORDER 1— <i>Miasmatic.</i>		ORDER 1— <i>Nervous.</i>		ORDER 6— <i>Generative.</i>	
Cholera Infantum.....	28	Apoplexia (Apoplexy).....	4	Tumor uteri (Uterine Tumor).....	1
Cholera Morbus.....	2	Convulsio (Convulsions)....	29	CLASS IV—Developmental.	
Cynanche trachealis (Membranous Croup).....	3	Encephalitis (Inflammation of the Brain).....	4	ORDER 1— <i>Children.</i>	
Diarrhœa acuta (Acute Diarrhœa).....	13	Hydrocephalus acutus Acute Hydrocephalus)....	2	Atelectasis pulmonum (—). 1	1
Diphtheria (Diphtheria)....	10	Meningitis.....	4	Cyanosis.....	1
Febris cerebro-spinalis (Cerebro Spinal Fever).....	1	Paralysis (Palsy).....	1	Natus Præter Naturam (Prematural Birth).....	2
Febris typhoides (Typhoid Fever).....	2	Tetanus (Lockjaw).....	1	Partus emortuus (Still Birth).....	15
Pertussis (Whooping Cough).....	1	ORDER 2— <i>Circulatory.</i>		Partus intempestivus (Premature Birth).....	2
Scarlatina (Scarlet Fever). 1		Endocarditis (Inflammation of Membrane lining Heart).....	1	ORDER 2— <i>Women.</i>	
ORDER 3— <i>Dietic.</i>		Epistaxis (Nose Bleed)....	1	Eclampsia parturi (Convulsions in Childbirth).....	2
Alcoholismus (Alcoholism).. 1		Morbus valvularum cordis (Valvular disease of Heart).....	1	Partus (Childbirth).....	1
ORDER 4— <i>Parasitic.</i>		ORDER 3— <i>Respiratory.</i>		ORDER 3— <i>Old Age.</i>	
Aptha (Trush).....	2	Bronchitis (Bronchitis)....	1	Senectus (Old Age).....	4
CLASS II—Constitutional.		Laryngitis (Inflammation of Larynx).....	1	ORDER 4— <i>Nutrition.</i>	
ORDER 1— <i>Diathetic.</i>		Pleuritis (Pleurisy).....	1	Atrophia (Atrophy).....	1
Carcinoma (Cancer).....	4	Pneumonia (Inflammation of Lung).....	3	Debilitas (Debility).....	12
Of Stomach.....	2	ORDER 4— <i>Digestive.</i>		CLASS V—Violence.	
Of Liver.....	1	Cirrhosis (—).....	1	ORDER 1— <i>Accident.</i>	
Not stated.....	1	Enteritis (Inflammation of Bowels).....	2	Submersio (Drowning)....	5
ORDER 2— <i>Tubercular.</i>		Gastritis (Inflammation of Stomach).....	8	Vulnera (Wounds).....	1
Phthisis pulmonalis (Consumption).....	13	Hepatitis (Inflammation of Liver).....	2	R. R. Accident.....	1
Tabes Mesenterica (Marasmus).....	8	Icterus (Jaundice).....	1	ORDER 4— <i>Suicide.</i>	
		Peritonitis (Inflammation of Abdomen).....	3	Submersio (Drowning)....	2
				Vulnera (Wounds).....	1

Total, (without still births and premature births) 196 or 19.0 per thousand of population per year.

SEX.

Adults—Male.....	30	Total Females.....	86
Adults—Female.....	20	Total Adults.....	50
Minors—Male.....	80	Total Minors.....	140
Minors—Female.....	66		
Total Males.....	110	Grand Total.....	196

COMPARATIVE MONTHLY STATEMENT.

Corresponding month in 1878.....	170	Corresponding month in 1876.....	198
Corresponding month in 1877.....	226		

JULY—Continued.

AGE.

	S.	M.	W.	Tl.		S.	M.	W.	Tl.
Males, under 1 year.....	61	--	--	61	Females, under 1 year....	43	--	--	43
“ from 1 to 5.....	8	--	--	8	“ from 1 to 5.....	10	--	--	10
“ from 5 to 20.....	11	--	--	11	“ from 5 to 20.....	12	--	--	12
“ from 20 to 30.....	7	--	--	7	“ from 20 to 30.....	2	2	--	4
“ from 30 to 40.....	2	2	--	4	“ from 30 to 40.....	--	2	--	2
“ from 40 to 50.....	--	3	--	3	“ from 40 to 50.....	--	3	--	3
“ from 50 to 60.....	--	7	--	7	“ from 50 to 60.....	1	4	--	5
“ from 60 to 70.....	2	3	--	5	“ from 60 to 70.....	--	3	--	3
“ from 70 to 80.....	--	2	1	3	“ from 70 to 80.....	--	--	--	2
“ over 80 years.....	--	--	1	1	“ over 80 years....	--	--	1	1
Total—Males.....	91	17	2	110	Total—Females.....	68	17	1	86
					Grand Total.....				196

NATIVITIES.

Milwaukee.....	140	France.....		Denmark.....	
Wisconsin.....	6	Russia.....		Austria.....	
Other States.....	7	Poland.....	2	Netherlands.....	
Germany.....	28	Switzerland.....		Not Given.....	4
Ireland.....	6	Bohemia.....		Italy.....	
England.....	1	Hungary.....		China.....	
Scotland.....	--	Holland.....	1		
Wales.....	--	Norway.....		Total.....	196
Canada.....	1	Sweden.....			

CEMETERIES WHERE INTERRED.

Almshouse Farm.....	4	National Home.....		Elsewhere.....	12
Calvary.....	49	Spring Hill.....	4		
Forest Home.....	53	Trinity.....	19	Total.....	196
Greenwood.....	--	Union.....	55		

LOCALITIES.

First Ward.....	14	Ninth Ward.....	21	Convent Notre Dame (First ward).....	1
Second Ward.....	20	Tenth Ward.....	18	Morgue Seventh ward.....	2
Third Ward.....	10	Eleventh Ward.....	13	Elsewhere.....	6
Fourth Ward.....	13	Twelfth Ward.....	16		
Fifth Ward.....	16	Thirteenth Ward.....	3	Total.....	196
Sixth Ward.....	19	St. Vincent's Infant Asylum (11th Ward).....	6		
Seventh Ward.....	6				
Eighth Ward.....	12				

DAILY MORTALITY.

1st.....	7	12th.....	3	23d.....	4
2d.....	4	13th.....	5	24th.....	4
3d.....	6	14th.....	10	25th.....	9
4th.....	3	15th.....	12	26th.....	7
5th.....	7	16th.....	11	27th.....	3
6th.....	5	17th.....	5	28th.....	9
7th.....	--	18th.....	6	29th.....	7
8th.....	1	19th.....	5	30th.....	9
9th.....	2	20th.....	7	31st.....	7
10th.....	5	21st.....	11		
11th.....	12	22d.....	10	Total.....	196

MONTHLY REPORT OF DEATHS

FOR

AUGUST, 1879.

CAUSES OF DEATHS.

CLASS I—Zymotic.		CLASS III—Local.		Nephria (Bright's Disease) 2	
ORDER 1— <i>Miasmatic.</i>		ORDER 1— <i>Nervous.</i>		ORDER 6— <i>Generative.</i>	
Cholera Infantum.....	45	Apoplexia (Apoplexy).....	1	Tumor uteri (Uterine Tu- mor).....	1
Cholera Morbus.....	3	Convulsio (Convulsions)...	22	ORDER 7— <i>Locomotive.</i>	
Cynanche trachealis (Mem- branaceous Croup).....	4	Encephalitis (Inflammation of Brain).....	2	Caries (—).....	1
Diarrhœa acuta (Acute Diarrhœa).....	29	Insania (Insanity).....	1	CLASS IV— <i>Developmental.</i>	
Dysenteria acuta (Acute Dysentery).....	13	Meningitis.....	4	ORDER 1— <i>Children.</i>	
Diphtheria (Diphtheria)...	13	Paralysis (Palsy).....	1	Dentitio (Teething).....	3
Febris cerebro-spinalis (Ce- rebro Spinal Fever).....	1	Tetanus (Lockjaw).....	2	Partus emortuus (Still- Birth).....	16
Febris typhoides (Typhoid Fever).....	2	ORDER 2— <i>Circulatory.</i>		Partus intempestivus (Pre- mature Birth).....	2
Miliaria (Miliaria).....	1	Morbus valvularum cordis (Valvular disease of Heart).....	3	ORDER 2— <i>Women.</i>	
Pertussis (Whooping Cough).....	1	ORDER 3— <i>Respiratory.</i>		Partus (Childbirth).....	1
ORDER 2— <i>Enthetic.</i>		Apoplexia pulmonalis (Con- gestion of Lungs).....	2	ORDER 3— <i>Old Age.</i>	
Syphilis primaria (Primary Syphilis).....	1	Bronchitis (Bronchitis)...	1	Senectus (Old Age).....	8
Syphilis secundaria (Secondary Syphilis)....	1	Pneumonia (Inflammation of Lungs).....	2	ORDER 4— <i>Nutritive.</i>	
CLASS II— <i>Constitutional.</i>		ORDER 4— <i>Digestive.</i>		Atrophia (Atrophy).....	3
ORDER 1— <i>Diathetic.</i>		Ententis (Inflammation of Bowels).....	3	Debilitas (Debility).....	6
Carcinoma (Cancer).....	3	Gastritis (Inflammation of Stomach).....	9	CLASS V— <i>Violence.</i>	
Of Stomach.....	2	Hepatitis (Inflammation of Liver).....	2	ORDER 1— <i>Accident.</i>	
Of Liver.....	1	Hernia (Rupture).....	1	Contusio (Concussion)...	1
Gangræna senilis (Dry Gangrene).....	1	Peritonitis (Inflammation of Abdomen).....	1	Submersio (Drowning)....	2
ORDER 2— <i>Tubercular.</i>		Ulcus stomachi (Ulcer of Stomach).....	1	Vulnera (Wounds).....	1
Hydrocephalus.....	3	ORDER 5— <i>Urinary.</i>		R. R. Accident.....	2
Meningitis tuberculosus (Tu- bercular Meningitis)....	1	Cystitis (Inflammation of Bladder).....	1	ORDER 4— <i>Suicide.</i>	
Phthisis pulmonalis (Con- sumption).....	11			Submersio (Drowning)....	1
Scrofula (Scrofula).....	1			Vulnera (Wounds).....	1
Tabes Mesenterica (Maras- mus).....	8				

Total, (without Still-Births and Premature Births) 228, or 22.1 per thousand of population per year.

SEX.

Adults—Male.....	28	Total Females.....	114
Adults—Females.....	23	Total Adults.....	51
Minors—Males.....	86	Total Minors.....	177
Minors—Females.....	91	Grand Total.....	
Total Males.....	114		

COMPARATIVE MONTHLY MORTALITY.

Corresponding month in 1878.....	246	Corresponding month in 1876.....	299
Corresponding month in 1877.....	195		

AUGUST,—Continued.

AGE.

	S.	M.	W.	Tl.		S.	M.	W.	Tl.
Males under 1 year.....	58			58	Females under 1 year....	66			66
“ from 1 to 5.....	20			20	“ from 1 to 5.....	13			13
“ from 5 to 20.....	8			8	“ from 5 to 20.....	12			12
“ from 20 to 30.....	2			2	“ from 20 to 30....	5	3		8
“ from 30 to 40.....	2	3		5	“ from 30 to 40....	1	6		7
“ from 40 to 50.....	2			2	“ from 40 to 50....	1	1		2
“ from 50 to 60.....	2	3		5	“ from 50 to 60....	1			1
“ from 60 to 70.....	2	2		4	“ from 60 to 70....	2	1		3
“ from 70 to 80.....	2	3	4	9	“ from 70 to 80....	2		2	4
“ over 80 years.....	2			2	“ over 80 years....	2			2
Total—Males.....	96	11		114	Total—Females.....	101	11	2	114
					Grand Total.....				228

NATIVITIES.

Milwaukee.....173	France.....	Denmark.....
Wisconsin.....3	Russia.....	Austria.....
Other States.....13	Poland.....1	Netherlands.....
Germany.....27	Switzerland.....	Not Given.....1
Ireland.....6	Bohemia.....	Italy.....
England.....2	Hungary.....	China.....
Scotland.....1	Holland.....	
Wales.....	Norway.....	Total.....228
Canada.....1	Sweden.....	

CEMETERIES WHERE INTERRED.

Almshouse Farm.....4	National Home.....1	Elsewhere.....12
Calvary.....49	Spring Hill.....2	
Forest Home.....66	Trinity.....30	Total.....228
Greenwood.....1	Union.....63	

LOCALITIES.

First Ward.....14	Ninth ward.....19	St. Vincent's Infant Asy-
Second Ward.....25	Tenth ward.....20	lum (11th ward).....1
Third Ward.....14	Eleventh ward.....26	County Hospital.....2
Fourth Ward.....12	Twelfth ward.....13	Asylum Little Sisters of
Fifth Ward.....10	Thirteenth ward.....7	Poor (4th ward).....1
Sixth Ward.....14	St. Mary's Hospital(1st	Elsewhere.....7
Seventh ward.....10	Ward).....1	
Eighth ward.....32		Total.....228

DAILY MORTALITY.

1st.....10	12th.....0	23d.....8
2d.....7	13th.....5	24th.....8
3d.....11	14th.....6	25th.....5
4th.....16	15th.....7	26th.....6
5th.....8	16th.....6	27th.....9
6th.....11	17th.....4	28th.....4
7th.....6	18th.....6	29th.....8
8th.....2	19th.....6	30th.....13
9th.....6	20th.....4	31st.....5
10th.....8	21st.....11	
11th.....8	22d.....7	Total.....228

MONTHLY REPORT OF DEATHS

FOR

SEPTEMBER, 1879.

CAUSES OF DEATH.

CLASS I—Zymotic.		Encephalitis (Inflammation of the Brain).....	2	Nephria (Bright's Disease).....	1
ORDER 1— <i>Miasmatic.</i>		Meningitis.....	2	Nephritis (Inflammation of Kidney).....	1
Cholera Infantum.....	5	Paralysis (Palsy).....	1	Albuminuria.....	1
Cynanche trachealis (Membranous Croup).....	4	Tetanus (Lockjaw).....	1	Uræmia.....	1
Diarrhoea acuta (Acute Diarrhoea).....	10	Trismus nascentium.....	1	ORDER 6— <i>Generative.</i>	
Dysentery acuta (Acute Dysentery).....	3	ORDER 2— <i>Circulatory.</i>		Morbus uteri (Uterine Disease).....	1
Diphtheria (Diphtheria).....	31	Carditis (Inflammation of Heart).....	1	CLASS IV—Developmental.	
Febris biliosa (Bilious Fever).....	8	Hydrops pericardii (Dropsey of Heart).....	1	ORDER 1— <i>Children.</i>	
Febris cerebro-spinalis (Cerebro Spinal Fever).....	2	Morbus valvularum cordis (Valvular disease of heart).....	4	Dentitio (Teething).....	1
Miliaria (Miliaria).....	2	Pericarditis (Inflammation of membrane covering Heart).....	1	Natus Præter Naturam (Prematural Birth).....	1
Pertussis (Whooping Cough).....	3	ORDER 3— <i>Respiratory.</i>		Partus emortuus (Still-Birth).....	10
CLASS II—Constitutional.		Apoplexia pulmonalis (Congestion of Lungs).....	1	Partus intempestivus (Premature Birth).....	1
ORDER 1— <i>Diathetic.</i>		Bronchitis (Bronchitis).....	1	Spina Bifida.....	1
Asthma (Spasmodic Asthma).....	1	Pneumonia (Inflammation of Lung).....	3	ORDER 2— <i>Women.</i>	
Carcinoma (Cancer).....	1	ORDER 4— <i>Digestive.</i>		Febris puerperalis (Puerperal Fever).....	1
Of Breast.....	1	Entiritis (Inflammation of Bowels).....	3	Chronic pelvic cellulitis.....	1
Gangræna senilis (Dry Gangrene).....	1	Gastritis (Inflammation of Stomach).....	5	ORDER 3— <i>Old Age.</i>	
Hydrops (Dropsey).....	1	Hepatitis (Inflammation of Liver).....	1	Senectus (Old Age).....	5
ORDER 2— <i>Tubercular.</i>		Hernia (Rupture).....	1	ORDER 4— <i>Nutrition.</i>	
Hydrocephalus.....	1	Peritonitis (Inflammation of Abdomen).....	3	Atrophia (Atrophy).....	3
Meningitis tuberculosis (Tubercular Meningitis).....	1	Stricture intestini (Stricture of Intestine).....	1	Debilitas (Debility).....	9
Phthisis pulmonalis (Consumption).....	11	Ulcer stomachi (Ulcer of Stomach).....	1	CLASS V—Violence.	
Tabes Mesenterica (Marasmus).....	6	ORDER 5— <i>Urinary.</i>		ORDER 1— <i>Accident.</i>	
CLASS III—Local.		Cystitis (Inflammation of Bladder).....	1	Fractura (Fracture).....	2
ORDER 1— <i>Nervous.</i>		ORDER 4— <i>Suicide.</i>		Submersio (Drowning).....	3
Apoplexia (Apoplexy).....	4	ORDER 3— <i>Violence.</i>		Vulnera (Wounds).....	2
Convulsio (Convulsions).....	19	ORDER 2— <i>Accident.</i>		By Railroad.....	2
		ORDER 1— <i>Accident.</i>		ORDER 4— <i>Suicide.</i>	
		ORDER 3— <i>Violence.</i>		Vulnera (Wounds).....	1

Total, (without still births and premature births) 189. Being 18.3 per thousand of population per year.

SEX.

Adults—Male.....	27	Total Females.....	96
Adults—Female.....	27	Total Adults.....	54
Minors—Male.....	66	Total Minors.....	135
Minors—Female.....	69	Grand Total.....	
Total—Males.....	93	189	

COMPARATIVE MONTHLY MORTALITY.

Corresponding month in 1878.....	198	Corresponding month in 1876.....	257
Corresponding month in 1877.....	179		

SEPTEMBER—Continued.

AGE.

	S.	M.	W.	T'l.		S.	M.	W.	T'l.
Males under 1 year.....	34	--	--	34	Females, under 1 year..	39	--	--	39
" from 1 to 5.....	23	--	--	23	" from 1 to 5....	11	--	--	11
" from 5 to 20.....	9	--	--	9	" from 5 to 20....	19	--	--	19
" from 20 to 30.....	4	1	--	5	" from 20 to 30..	5	2	--	7
" from 30 to 40.....	2	1	--	3	" from 30 to 40..	1	7	--	8
" from 40 to 50.....	--	4	--	4	" from 40 to 50..	1	--	--	1
" from 50 to 60.....	1	1	1	3	" from 50 to 60..	--	1	1	2
" from 60 to 70.....	--	6	1	7	" from 60 to 70..	1	4	--	5
" from 70 to 80.....	--	2	1	3	" from 70 to 80..	--	1	2	3
" over 80 years.....	--	1	1	2	" over 80 years..	--	--	1	1
Total—Males.....	73	16	4	93	Total—Females....	77	15	4	96
					Grand Total.....				189

NATIVITIES.

Milwaukee.....132	France.....	Denmark.....
Wisconsin.....4	Russia.....	Austria.....
Other States.....9	Poland.....	Netherlands.....
Germany.....24	Switzerland.....	Not given.....5
Ireland.....9	Bohemia.....	Italy.....
England.....1	Hungary.....	China.....
Scotland.....	Holland.....3	
Wales.....	Norway.....1	Total.....189
Canada.....1	Sweden.....	

CEMETERIES WHERE INTERRED.

Alms-house Farm.....1	National Home.....	Elsewhere.....13
Calvary.....48	Spring Hill.....1	
Forest Home.....62	Trinity.....14	Total.....189
Greenwood.....	Union.....50	

LOCALITIES.

First Ward.....22	Ninth Ward.....11	St. Vincent's Infant Asy-
Second Ward.....19	Tenth Ward.....10	lum (5th Ward).....7
Third Ward.....11	Eleventh Ward.....19	Milwaukee Hospital (2d
Fourth Ward.....13	Twelfth Ward.....12	Ward).....1
Fifth Ward.....21	Thirteenth Ward.....7	Convent Notre Dame
Sixth Ward.....10	St. Mary's Hospital (1st	(1st Ward).....1
Seventh Ward.....6	Ward.....2	
Eighth Ward.....17		Total.....189

DAILY MORTALITY.

1st.....5	12th.....5	23d.....9
2d.....8	13th.....7	24th.....6
3d.....7	14th.....6	25th.....7
4th.....2	15th.....3	26th.....5
5th.....4	16th.....7	27th.....6
6th.....7	17th.....9	28th.....8
7th.....5	18th.....2	29th.....10
8th.....9	19th.....11	30th.....6
9th.....8	20th.....5	
10th.....7	21st.....3	
11th.....7	22d.....5	Total.....189

MONTHLY REPORT OF DEATHS

FOR

OCTOBER, 1879.

CAUSES OF DEATH.

CLASS I—Zymotic.		CLASS IV—Developmental.	
ORDER 1— <i>Miasmatic.</i>		ORDER 1— <i>Children.</i>	
Cholera Infantum.....	1	Dentitio (Teething).....	1
Cynanche trachealis (Mem- branous Croup).....	7	Partus emortuus (Still- Birth).....	15
Diarrhoea Acute (Acute Diarrhoea).....	2	Partus intempestivus (Pre- mature Birth).....	7
Diphtheria (Diphtheria)....	21	Spina Bifida.....	1
Febris biliosa (Bilious Fever).....	6	ORDER 2— <i>Women.</i>	
Febris cerebro-spinalis (Cer- ebro Spinal Fever).....	1	Febris puerperalis (Puer- peral Fever).....	2
ORDER 3— <i>Dietic.</i>		Phlegmasia dolens (Milk Leg).....	2
Alcoholismus (Alcoholism). 1		Chronic pelvic cell cellulitis. 1	
CLASS II—Constitutional.		ORDER 3— <i>Old Age.</i>	
ORDER 1— <i>Diathetic.</i>		Senectus (Old Age).....	
Anæmia (Anæmia).....	1	ORDER 4— <i>Nutrition.</i>	
Carcinoma (Cancer).....	2	Atrophia (Atrophy).....	3
Of Stomach).....	2	Debilitas (Debility).....	5
Hydrops (Dropsey).....	3	CLASS V—Violence.	
Rheumatismus (Rheuma- tism).....	1	ORDER 1— <i>Accident.</i>	
ORDER 2— <i>Tubercular.</i>		Ambustra (Burns and Scalds).....	1
Hydrocephalus.....	1	Submersio (Drowning)....	2
Phthisis pulmonalis (Con- sumption).....	15	Railroad Accident.....	9
Scrofula (Scrofula).....	1	A fall from Wagon.....	1
Tabes Mesenterica (Maras- mus).....	3	ORDER 4— <i>Suicide.</i>	
CLASS III—Local.		Suspendium (Hanging)....	1
ORDER 1— <i>Nervous.</i>		Venenatio (Poisoning).....	1
Apoplexia (Apoplexy).....	2	Vulnera (Wounds).....	1
Convulsio (Convulsions)....	18		
Hydrocephalus acutus (Acute Hydrocephalus)....	2		
Meningitis.....	4		
Paralysis (Palsy).....	3		
ORDER 2— <i>Circulatory.</i>			
Morbus valvularum cordis (Valvular disease of Heart).....	2		
ORDER 3— <i>Respiratory.</i>			
Apoplexia pulmonalis (Con- gestion of Lungs).....	4		
Bronchitis (Bronchitis)....	2		
Laryngitis (Inflammation of Larynx).....	1		
Pleuritis (Pleurisy).....	1		
Pneumonia (Inflammation of Lungs).....	10		
ORDER 4— <i>Digestive.</i>			
Colico (Colic).....	1		
Enteritis (Inflammation of Bowels).....	3		
Gastritis (Inflammation of Stomach).....	2		
Icterus (Jaundice).....	1		
Peritonitis (Inflammation of Abdomen).....	3		
ORDER 5— <i>Urinary.</i>			
Nephia (Bright's Disease). 2			
ORDER 6— <i>Generative.</i>			
Metritis (Inflammation of Womb).....	1		
Tumor ovarii (Ovarian Tu- mor).....	1		

Total, (without Still-Births and Premature Births) 154, being 14.9 per thousand of Population per year.

SEX.

Adults—Males.....	30	Total Females.....	74
Adults—Females.....	28	Total Adults.....	58
Minors—Males.....	50	Total Minors.....	96
Minors—Females.....	46		
Total Males.....	80	Grand Total.....	154

COMPARATIVE MONTHLY MORTALITY.

Corresponding month in 1878.....	152	Corresponding month in 1876.....	189
Corresponding month in 1877.....	169		

OCTOBER—*Continued.*

AGE.

	S.	M.	W.	T'l.		S.	M.	W.	T'l.
Males under 1 year.....	21	..	..	21	Females under 1 year....	24	..	..	24
“ from 1 to 5.....	16	..	..	16	“ from 1 to 5.....	12	..	..	12
“ from 5 to 20.....	13	..	..	13	“ from 5 to 20.....	10	..	..	10
“ from 20 to 30.....	3	2	..	5	“ from 20 to 30..m	1	5	..	6
“ from 30 to 40.....	..	7	..	7	“ from 30 to 40.....	2	5	..	7
“ from 40 to 50.....	2	2	1	5	“ from 40 to 50.....	1	4	..	5
“ from 50 to 60.....	1	5	..	6	“ from 50 to 60.....	..	3	..	3
“ from 60 to 70.....	..	3	..	3	“ from 60 to 70.....	..	3	..	3
“ from 70 to 80.....	..	3	..	3	“ from 70 to 80.....	1	1	1	3
“ over 80 years.....	..	1	..	1	“ over 80 years....	..	1	..	1
Total—Males.....	56	23	1	80	Total—Females.....	51	22	1	74
					Grand Total.....				154

NATIVITIES.

Milwaukee.....	90	France.....	..	Denmark.....	..
Wisconsin.....	6	Russia.....	..	Austria.....	..
Other States.....	4	Poland.....	2	Netherlands.....	..
Germany.....	28	Switzerland.....	1	Not Given.....	3
Ireland.....	10	Bohemia.....	2	Italy.....	..
England.....	2	Hungary.....	..	China.....	..
Scotland.....	..	Holland.....	5		
Wales.....	..	Norway.....	1	Total.....	154
Canada.....	1	Sweden.....	..		

CEMETERIES WHERE INTERRED.

Almshouse Farm.....	..	National Home.....	..	Elsewhere.....	11
Calv ry.....	46	Spring Hill.....	2	Total.....	154
Forest Home.....	40	Trinity.....	14		
Greenwood.....	1	Union.....	40		

LOCALITIES.

First Ward.....	15	Ninth Ward.....	18	St. Vincent's Infant Asy-	
Second Ward.....	14	Tenth Ward.....	10	lum, (11th Ward).....	5
Third Ward.....	10	Eleventh Ward.....	11	St. Rose Orphan Asylum	
Fourth Ward.....	19	Twelfth Ward.....	8	(Seventh ward).....	1
Fifth Ward.....	13	Thirteenth Ward.....	2	Morgue, Seventh ward..	1
Sixth Ward.....	11	St. Mary's Hospital (1st		Total.....	154
Seventh Ward.....	4	Ward.....	1		
Eighth Ward.....	11				

DAILY MORTALITY.

1st.....	5	12th.....	3	23d.....	6
2d.....	4	13th.....	5	24th.....	4
3d.....	6	14th.....	4	25th.....	4
4th.....	5	15th.....	2	26th.....	10
5th.....	7	16th.....	6	27th.....	5
6th.....	4	17th.....	4	28th.....	6
7th.....	6	18th.....	6	29th.....	4
8th.....	9	19th.....	6	30th.....	4
9th.....	2	20th.....	8	21st.....	2
10th.....	4	21st.....	5	Total.....	154
11th.....	6	22d.....	2		

MONTHLY REPORT OF DEATHS

FOR .

NOVEMBER, 1879.

CAUSES OF DEATH.

CLASS I—Zymotic.		CLASS III—Local.		Diabetes (—)..... 1	
ORDER 1— <i>Miasmatic.</i>		ORDER 1— <i>Nervous.</i>		Nephria (Bright's Disease) 2	
Cynanche trachealis (Mem-		Apoplexia (Apoplexy).... 2		ORDER 8— <i>Integumentary.</i>	
branous Croup)..... 9		Convulsio (Convulsions)... 17		Eczema (—)..... 2	
Dysentery acute (Acute		Meningitis..... 2		CLASS IV—Developmental.	
Dysentery)..... 1		Paralysis (Palsy)..... 4		ORDER 1— <i>Children.</i>	
Diphtheria (Diphtheria)... 22		ORDER 2— <i>Circulatory.</i>		Cyanosis..... 1	
Febris biliosa (Bilious		Morbus valvularum cordis		Partus emortuus (Still	
Fever)..... 3		(Valvular disease of		Birth)..... 10	
Febris cerebro-spinalis (Ce-		Heart)..... 4		ORDER 2— <i>Women.</i>	
rebro Spinal Fever)..... 1		ORDER 3— <i>Respiratory.</i>		Febris puerperalis (Puer-	
Febris typhoides (Typhoid		Apoplexia pulmonalis (Con-		peral Fever)..... 1	
Fever)..... 2		gestion of Lungs)..... 2		Hæmorrhagia post partum	
Tonsillitis (Quinsy)..... 1		Laryngitis (Inflammation of		(Flooding)..... 1	
CLASS II—Constitutional.		Larynx)..... 2		ORDER 3— <i>Old Age.</i>	
ORDER 1— <i>Diathetic.</i>		Pneumonia (Inflammation		Senectus (Old Age)..... 5	
Carcinoma (Cancer)..... 5		of Lung)..... 7		ORDER 4— <i>Nutrition.</i>	
Of Stomach..... 2		ORDER 4— <i>Digestive.</i>		Atrophia (Atrophy)..... 1	
Of Face..... 1		Enteritis (Inflammation of		Debilitas (Debility)..... 1	
Not stated..... 2		Bowels)..... 1		CLASS V—Violence.	
Hydrops (Dropsy)..... 5		Gastritis (Inflammation of		ORDER 1— <i>Accident.</i>	
ORDER 2— <i>Tubercular.</i>		Stomach)..... 3		ORDER 1— <i>Accident.</i>	
Meningitis tuberculosus (Tu-		Hepatitis (Inflammation of		Ambusta (Burns and	
bercular Meningitis)..... 1		Liver)..... 2		Scalds)..... 1	
Peritonitis tuberculosus (Tu-		Peritonitis (Inflammation of		Submersio (Drowning).... 2	
bercular Peritonitis)..... 1		Abdomen)..... 2		R. R. Accident..... 2	
Phthisis pulmonalis (Con-		ORDER 5— <i>Urinary.</i>		ORDER 4— <i>Suicide.</i>	
sumption)..... 10		Cystitis (Inflammation of		Vulner (Wounds)..... 1	
Tabes Mesenterica (Mar-		Bladder)..... 2			
asmus)..... 3					

Total, (without still births and premature births) 134 or 13.0 per thousand of population per year.

SEX.

Adults—Male..... 31	Total Females..... 62
Adults—Female..... 22	Total Adults..... 53
Minors—Male..... 41	Total Minors..... 81
Minors—Female..... 40	
Total Males..... 72	Grand Total..... 134

COMPARATIVE MONTHLY STATEMENT.

Corresponding month in 1878..... 158	Corresponding month in 1876..... 236
Corresponding month in 1877..... 168	

NOVEMBER—*Continued.*

AGE.

	S.	M.	W.	T'l.		S.	M.	W.	T'l.
Males under 1 year.....	10	..	..	10	Females under 1 year....	8	..	..	8
" from 1 to 5.....	21	..	..	21	" from 1 to 5.....	15	..	..	15
" from 5 to 20.....	10	..	..	10	" from 5 to 20.....	17	..	..	17
" from 20 to 30.....	6	1	..	7	" from 20 to 30.....	..	2	1	3
" from 30 to 40.....	2	4	1	6	" from 30 to 40.....	..	2	..	2
" from 40 to 50.....	1	5	1	7	" from 40 to 50.....	..	2	..	2
" from 50 to 60.....	..	1	1	2	" from 50 to 60.....	1	4	1	6
" from 60 to 70.....	..	3	..	4	" from 60 to 70.....	..	..	3	3
" from 70 to 80.....	..	5	..	5	" from 70 to 80.....	..	2	3	5
" over 80 years.....	..	..	..	..	" over 80 years.....	..	..	1	1
Total—Males.....	50	19	3	72	Total—Females.....	43	12	9	62
					Grand Total.....				134

NATIVITIES.

Milwaukee.....	71	France.....	..	Denmark.....	..
Wisconsin.....	6	Russia.....	1	Austria.....	..
Other States.....	6	Poland.....	..	Netherlands.....	..
Germany.....	42	Switzerland.....	..	Not Given.....	1
Ireland.....	4	Bohemia.....	..	Italy.....	..
England.....	..	Hungary.....	..	China.....	..
Scotland.....	..	Holland.....	2		
Wales.....	1	Norway.....	..	Total.....	134
Canada.....	..	Sweden.....	..		

CEMETERIES WHERE INTERRED.

Almshouse Farm.....	1	National Home.....	..	Elsewhere.....	9
Calvary.....	34	Spring Hill.....	1	Total.....	134
Forest Home.....	33	Trinity.....	12		
Greenwood.....	1	Union.....	43		

LOCALITIES.

First Ward.....	18	Ninth ward.....	16	Morgue (7th ward).....	1
Second Ward.....	13	Tenth ward.....	9	Total.....	134
Third Ward.....	8	Eleventh ward.....	10		
Fourth Ward.....	7	Twelfth ward.....	9		
Fifth Ward.....	15	Thirteenth ward.....	2		
Sixth Ward.....	10	St. Mary's Hospital(1st	..		
Seventh ward.....	4	Ward).....	1		
Eighth ward.....	11				

DAILY MORTALITY.

1st.....	6	12th.....	4	23d.....	5
2d.....	4	13th.....	1	24th.....	4
3d.....	4	14th.....	9	25th.....	1
4th.....	5	15th.....	9	26th.....	5
5th.....	3	16th.....	1	27th.....	9
6th.....	5	17th.....	2	28th.....	3
7th.....	3	18th.....	5	29th.....	8
8th.....	2	19th.....	5	30th.....	5
9th.....	5	20th.....	1		
10th.....	9	21st.....	4	Total.....	134
11th.....	5	22d.....	2		

MONTHLY REPORT OF DEATHS

FOR

DECEMBER, 1879.

CAUSES OF DEATH.

CLASS I—Zymotic.		CLASS III—Local.		ORDER 5—Urinary.	
ORDER 1—Miasmatic.		ORDER 1—Nervous.		Nephria (Bright's Disease) 2	
Cynanche trachealis (Mem- branous Croup)..... 8		Apoplexia (Apoplexy)..... 2		ORDER 7—Locomotive.	
Diphtheria (Diphtheria).... 20		Convulsio (Convulsions).... 17		Exostitis (Tumor of Bones) 1	
Erysipelas (Erysipelas).... 2		Encephalitis (Inflammation of the Brain)..... 1		CLASS IV—Developmental.	
Febriscerebro-spinalis (Cer- ebro Spinal Fever)..... 1		Laryngismus stridulus (False Croup)..... 1		ORDER 1—Children.	
Febris remittens (Remittent Fever)..... 1		Meningitis..... 1		Atelectasis pulmonum (—). 1	
Febris typhoides (Typhoid Fever)..... 1		Myelitis (Inflammation of Spinal Cord)..... 1		Cyanosis..... 1	
Pertussis (Whooping Cough)..... 1		Paralysis (Palsy)..... 1		Hæmorrhagia umbilicalis (Umbilical Hemorrhage) 1	
Scarlatina (Scarlet Fever). 3		ORDER 2—Circulatory.		Partus emortuus (Still- Birth)..... 16	
ORDER 4—Parasitic.		Embolismus (Embolism).... 1		Partus intempestivus (Pre- mature Birth)..... 5	
Apthæ (Trush)..... 1		Morbus valvularum cordis (Valvular disease of heart) 4		ORDER 2—Women.	
CLASS II—Constitutional.		ORDER 3—Respiratory.		Chlorosis (—)..... 1	
ORDER 1—Diathetic.		Apoplexia pulmonalis (Con- gestion of Lungs)..... 4		Febris puerperalis (Puer- peral Fever)..... 2	
Carcinoma (Cancer)..... 1		Bronchitis (Bronchitis).... 2		ORDER 3—Old Age.	
Of Womb..... 1		Emphysema..... 2		Senectus (Old Age)..... 4	
Hydrops (Dropsy)..... 2		Laryngitis (Inflammation of Larynx)..... 3		ORDER 4—Nutrition	
Rheumatismus (Rheuma- tism)..... 1		Pneumonia (Inflammation of Lung)..... 9		Atrophia (Atrophy)..... 1	
ORDER 2—Tubercular.		Oedema Lungs..... 2		Debilitas (Debility)..... 4	
Hydrocephalus..... 1		ORDER 4—Digestive.		CLASS V—Violence.	
Meningitis tuberculosus (Tu- bercular Meningitis)..... 1		Enteritis (Inflammation of Bowels)..... 1		ORDER 1—Accident.	
Phthisis pulmonalis (Con- sumption)..... 15		Hernia (Rupture)..... 1		Ambusta (Burns and Scalds)..... 2	
Tabes Mesenterica (Maras- mus)..... 2		Icterus (Jaundice)..... 1		Crushed by Machinery 1	
		Peritonitis (Inflammation of Abdomen)..... 1		ORDER 4—Suicide.	
				Vulnera (Wounds)..... 1	

Total, (without still births and premature births) 137. Being 13.3 per thousand of popu-
lation per year.

SEX.

Adults—Male..... 20	Total Females..... 64
Adults—Female..... 29	Total Adults..... 49
Minors—Male..... 53	Total Minors..... 88
Minors—Female..... 35	
Total—Males..... 73	Grand Total..... 137

COMPARATIVE MONTHLY MORTALITY.

Corresponding month in 1878..... 157	Corresponding month in 1876..... 208
Corresponding month in 1877..... 180	

DECEMBER—*Continued.*

AGE.

	S.	M.	W.	T'l.		S.	M.	W.	T'l.
Males under 1 year.....	17	--	--	17	Females, under 1 year..	16	--	--	16
" from 1 to 5.....	25	--	--	25	" from 1 to 5....	8	--	--	8
" from 5 to 20.....	11	--	--	11	" from 5 to 20....	11	--	--	11
" from 20 to 30.....	4	3	--	7	" from 20 to 30...	2	6	--	8
" from 30 to 40.....	2	3	--	5	" from 30 to 40..	1	4	--	5
" from 40 to 50.....	--	--	--	--	" from 40 to 50...	--	3	1	4
" from 50 to 60.....	--	2	--	2	" from 50 to 60...	--	4	--	5
" from 60 to 70.....	1	1	--	2	" from 60 to 70..	1	2	--	3
" from 70 to 80.....	--	1	2	3	" from 70 to 80..	1	1	1	2
" over 80 years.....	--	--	1	1	" over 80 years...	--	--	2	2
Total—Males.....	60	10	3	73	Total—Females...	40	20	4	64
					Grand Total.....				137

NATIVITIES.

Milwaukee.....	78	France.....		Denmark.....	
Wisconsin.....	10	Russia.....		Austria.....	1
Other States.....	14	Poland.....		Netherlands.....	
Germany.....	23	Switzerland.....	1	Not given.....	
Ireland.....	8	Bohemia.....		Italy.....	
England.....		Hungary.....		China.....	
Scotland.....		Holland.....			
Wales.....		Norway.....		Total.....	137
Canada.....	2	Sweden.....			

CEMETERIES WHERE INTERRED.

Almshouse Farm.....		National Home.....		Elsewhere.....	6
Calvary.....	41	Spring Hill.....	1	Total.....	137
Forest Home.....	36	Trinity.....	17		
Greenwood.....	2	Union.....	34		

LOCALITIES.

First Ward.....	15	Ninth Ward.....	8	St. Vincent's Infant Asy-	
Second Ward.....	14	Tenth Ward.....	7	lum (11th Ward).....	1
Third Ward.....	11	Eleventh Ward.....	17	Asylum Little Sisters	
Fourth Ward.....	13	Twelfth Ward.....	7	Poor, (4th ward).....	1
Fifth Ward.....	12	Thirteenth Ward.....	1	Total.....	137
Sixth Ward.....	11	St. Mary's Institute (1st			
Seventh Ward.....	10	Ward.....	1		
Eighth Ward.....	8				

DAILY MORTALITY.

1st.....	5	12th.....	8	23d.....	4
2d.....	7	13th.....	4	24th.....	2
3d.....	7	14th.....	5	25th.....	6
4th.....	5	15th.....	4	26th.....	4
5th.....	6	16th.....	2	27th.....	4
6th.....	7	17th.....	3	28th.....	3
7th.....	3	18th.....	2	29th.....	4
8th.....	5	19th.....	6	30th.....	7
9th.....	2	20th.....	2		7
10th.....	2	21st.....	4	Total.....	137
11th.....	3	22d.....	4		

SUMMARY OF MORTALITY

FOR THE YEAR 1879.

Total deaths, 1965; or 15.85 per thousand of population.

CAUSES OF DEATH.

CLASS I—Zymotic.		Of Womb.....	1	Degeneratio cordis (Fatty		
ORDER 1—Miasmatic.		Of Stomach).....	15	Degeneration of Heart.....	1	
Cholera Infantum.....	83	Of Uterus.....	9	Embolismus (Embolism)...	5	
Cholera Morbus.....	5	Of Liver.....	2	Endocarditis (Inflammation		
Cynanche trachealis (Mem-		Of Breast.....	1	of Membrane lining		
branous Croup).....	83	Of Face.....	1	Heart).....	2	
Diarrhœa Acute (Acute		Of Bladder.....	1	Epistaxis (Nose Bleed)....	1	
Diarrhœa).....	57	Gangræna senilis (Dry Gan-		Hydrops pericardii (Dropsy		
Diarrhœa chronica (Chronic		grene).....	3	of Heart.....	1	
Diarrhœa).....	2	Hydrops (Dropsy).....	16	Hypertrophia cordis (En-		
Dysentery acuta (Acute		Rheumatismus (Rheuma-		largement of Heart).....	3	
Dysentery).....	10	tism).....	3	Morbus valvularum cordis		
Diphtheria (Diphtheria)...	212	ORDER 2—Tubercular.				
Erysipelas (Erysipelas)...	5	Hydrocephalus.....	10	(Valvular disease of		
Febris biliosa (Bilious		Meningitis tuberculosis (Tu-		Heart).....	22	
Fever).....	18	bercular Meningitis).....	7	Pericarditis (Inflammation		
Febris cerebro-spinalis (Cere-		Peritonitis tuberculosis (Tu-		of membrane covering		
bro Spinal Fever).....	13	bercular Peritonitis).....	5	Heart).....	5	
Febris intermittens (Inter-		Phthisis pulmonalis (Con-		ORDER 3—Respiratory.		
mittent Fever).....	2	sumption).....	170	Apoplexia pulmonalis (Con-		
Febris typhoides (Typhoid		Scrofula (Scrofula).....	9	gestion of Lungs).....	22	
Fever).....	17	Tabes Mesenterica (Maras-		Bronchitis (Bronchitis)....	43	
Febris typhus (Typhus Fe-		mus).....	45	Emphysema.....	3	
ver).....	2	Tuberculosis.....	45	Empyema.....	1	
Miliaria (Miliaria).....	3	CLASS III—Local.				
Morbilli (Measles).....	4	ORDER 1—Nervous.				
Pertussis (Whooping		Apoplexia (Apoplexy).....	31	Pleuritis (Pleurisy).....	6	
Cough).....	15	Convulsio (Convulsions)...	247	Pleuro-Pneumonia (Pleurisy		
Pyæmia (Pyæmia).....	7	Encephalitis (Inflammation		and Inflammation of		
Scarlatina (Scarlet Fever)...	9	of the Brain).....	20	Lungs).....	6	
Tonsillitis (Quinsy).....	2	Epilepsia (Epilepsy).....	1	Pneumonia (Inflammation		
Septicæmia.....	2	Hemiplegia (Paralysis of one		of Lungs).....	117	
ORDER 2—Euthetic.		side of the Body).....	1	ORDER 4—Digestive.		
Hydrophobia (Hydrophobia)	1	Hydrocephalus acutus		Ascites (Abdominal Dropsy)	3	
Phagadæna gangrænosa		(Acute Hydrocephalus)...	4	Chololithus (Gallstones)...	1	
(Hospital Gangrene).....	1	Insania (Insanity).....	1	Cirrhotis (—).....	4	
Syphilis primaria (Primary		Laryngismus stridulus		Colico (Colic).....	1	
Syphilis).....	1	(False Croup).....	2	Dyspepsia (Indigestion)...	1	
Syphilis secundaria		Meningitis.....	49	Enteritis (Inflammation of		
(Secondary Syphilis)....	1	Myelitis (Inflammation of		Bowels).....	24	
ORDER 3—Dietic.		Spinal Cord).....	2	Gastritis (Inflammation of		
Alcoholismus (Alcoholism)...	2	Necrencephalus (Softening		Stomach).....	31	
ORDER 4—Parasitic.		of Brain).....	4	Hepatitis (Inflammation of		
Aphthæ (Thrush).....	3	Paralysis (Palsy).....	20	Liver.....	10	
CLASS II—Constitutional.		Tetanus (Lockjaw).....	6	Hernia (Rupture).....	5	
ORDER 1—Diathetic.		Trismus nascentium.....	1	Icterus (Jaundice).....	3	
Anæmia (Anæmia).....	3	Spasms.....	1	Peritonitis (Inflammation of		
Anasarca (General Dropsy)	16	ORDER 2—Circulatory.				
Asthma (Spasmodic As-		Angina pectoris (Breast		Abdomen).....	20	
thma).....	5	pang).....	1	Edema Lungs.....	5	
Carcinoma (Cancer) (Not		Atrophica cordis (Atrophy of		Stricture intestini (Stricture		
stated).....	8	Heart).....	33	of Intestine).....	1	
		Carditis (Inflammation of		Ulcus stomachi (Ulcer of		
		Heart).....	4	Stomach).....	5	
				Inanition.....	1	

SUMMARY OF MORTALITY.—*Continued.*

ORDER 5— <i>Urinary.</i>		CLASS IV— <i>Developmental.</i>		ORDER 4— <i>Nutrition.</i>	
Cystitis (Inflammation of Bladder).....		ORDER 1— <i>Children.</i>		Atrophia (Atrophy).....	
Diabetes.....		Atelectasis pulmonum (—).....		Debilitas (Debility).....	
Hamaturia (Bloody Urine).....		Cyanosis.....		CLASS V— <i>Violence.</i>	
Nephia (Bright's Disease).....		Dentitio (Teething).....		ORDER 1— <i>Accident.</i>	
Nephritis (Inflammation of Kidney).....		Natus Præter Naturam (Preternatural Birth).....		Ambusta (Burns and Scalds).....	
Uraemia.....		Partus emortuus (Still-Birth).....		Concussio (Concussion).....	
Albuminuria.....		Partus intempestivus (Premature Birth).....		Contusio (Contusion).....	
ORDER 6— <i>Generative.</i>		Spina Bifida.....		Fractura (Fracture).....	
Metritis (Inflammation of Womb).....		ORDER 2— <i>Women.</i>		Gelatio (Freezing).....	
Morbus uteri (Uterine Disease).....		Chlorosis (—).....		Suffocatio (Suffocation).....	
Tumor ovarii (Ovarian Tumor).....		Eclampsia parturi (Convulsions in Childbirth).....		Submersio (Drowning).....	
Tumor uteri (Uterine Tumor).....		Febris puerperalis (Puerperal Fever).....		Venenatio (Poisoning).....	
ORDER 7— <i>Locomotive.</i>		Hæmorrhagia post partum (Flooding).....		Vulnera (Wounds).....	
Caries (—).....		Partus (Childbirth).....		Crushed by Machinery.....	
Exostitis (Tumor of Bones).....		Phlegmasia dolens (Milk Leg).....		Railroad Accidents.....	
Necrosis (—).....		Chronic pelvic cell cellulitis.....		A fall from Building.....	
ORDER 8— <i>Integumentary.</i>		ORDER 3— <i>Old Age.</i>		A fall from Wagon.....	
Eczema (—).....		Senectus (Old Age).....		ORDER 4— <i>Suicide.</i>	
		—(Senile Debility).....		Submersio (Drowning).....	
				Suspendium (Hanging).....	
				Venenatio (Poisoning).....	
				Vulnera (Wounds).....	

SEX.

Adults—Males.....	345	Total Females.....	933
Adults—Females.....	296	Total Adults.....	641
Minors—Males.....	687	Total Minors.....	1324
Minors—Females.....	637		
Total Males.....	1032	Grand Total.....	1965

AGE.

	S.	M.	W.	T'L.		S.	M.	W.	T'L.
Males under 1 year.....	362	---	---	362	Females under 1 year.....	311	---	---	311
“ from 1 to 5.....	201	---	---	201	“ from 1 to 5.....	186	---	---	186
“ from 5 to 20.....	124	---	---	124	“ from 5 to 20.....	135	4	---	139
“ from 20 to 30.....	45	19	---	64	“ from 20 to 30.....	26	38	2	66
“ from 30 to 40.....	17	37	---	54	“ from 30 to 40.....	8	49	---	57
“ from 40 to 50.....	9	30	3	42	“ from 40 to 50.....	5	26	3	34
“ from 50 to 60.....	6	53	7	66	“ from 50 to 60.....	7	36	4	47
“ from 60 to 70.....	8	45	6	59	“ from 60 to 70.....	6	30	7	43
“ from 70 to 80.....	4	28	11	43	“ from 70 to 80.....	4	17	16	37
“ over 80 years.....	2	7	8	17	“ over 80 years.....	---	5	8	13
Total—Males.....	778	219	35	1032	Total—Females.....	688	205	40	933
					Grand Total.....				1965

SUMMARY OF MORTALITY—*Continued.*

NATIVITIES.

Milwaukee.....	1248	Poland.....	8	Not Given.....	16
Wisconsin.....	64	Switzerland.....	6		
Other States.....	116	Bohemia.....	10	Total.....	1965
Germany.....	355	Holland.....	13		
Ireland.....	79	Norway.....	8		
England.....	18	Russia.....	1		
Scotland.....	7	Hungary.....	1		
Canada.....	10	Austria.....	2		
France.....	1	Netherlands.....	2		

CEMETERIES WHERE INTERRED.

Almshouse Farm.....	14	National Home.....	1	Elsewhere.....	100
Calvary.....	491	Spring Hill.....	16		
Forest Home.....	556	Trinity.....	206	Total.....	1965
Greenwood.....	10	Union.....	571		

LOCALITIES.

First Ward.....	164	Thirteenth Ward.....	58	St. Rose Orphan Asylum (Seventh ward).....	1
Second Ward.....	196	St. Mary's Hospital (1st Ward.....	13	St. Mary's Institute (Notra Dame, 1st Wd).....	2
Third Ward.....	122	St. Vincent's Infant Asy- lum, (11th Ward).....	34	South Side Police Sta- tion (5th ward).....	1
Fourth Ward.....	172	Milwaukee Hospital.....	3	Elsewhere.....	13
Fifth Ward.....	156	Alms House.....	2		
Sixth Ward.....	133	Morgue, Seventh ward.....	5	Total.....	1965
Seventh Ward.....	84	Asylum Little Sisters Poor, (4th Ward).....	5		
Eighth Ward.....	154	County Hospital.....	2		
Ninth Ward.....	175				
Tenth Ward.....	154				
Eleventh Ward.....	200				
Twelfth Ward.....	116				

TABLE SHOWING MORTALITY FOR 1879 BY MONTHS AND LOCALITIES, AND THE PER-
CENTAGE OF EACH LOCALITY TO THE WHOLE MORTALITY.

	Jan.	Feb.	March	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.	Per Cent. to Whole.
First ward.....	10	14	11	8	13	10	14	14	22	15	18	15	164	8.3
Second ward.....	16	21	13	18	10	13	20	25	19	14	13	14	196	10.0
Third ward.....	9	10	13	9	9	8	10	14	11	10	8	11	122	6.2
Fourth ward.....	15	13	18	20	12	17	13	12	13	19	7	13	172	8.7
Fifth ward.....	14	13	14	13	9	6	16	10	21	13	15	12	156	8.
Sixth ward.....	11	12	9	12	8	6	19	14	10	11	10	11	133	6.7
Seventh ward.....	6	4	10	11	7	6	6	6	6	4	4	10	84	4.3
Eighth ward.....	11	12	13	11	6	10	12	32	17	11	11	8	154	7.9
Ninth ward.....	7	13	22	10	11	19	21	19	11	18	16	8	175	8.9
Tenth ward.....	13	11	15	18	8	15	18	20	10	10	9	7	154	7.9
Eleventh ward.....	18	14	22	17	20	13	13	26	19	11	10	17	200	10.2
Twelfth ward.....	20	3	8	8	9	3	16	13	12	8	9	7	116	5.8
Thirteenth ward.....	8	4	10	6	5	3	3	7	7	2	2	1	58	2.9
St. Rose's Orphan Asylum.....	1	1	3	.....	.....	.....	.....	.....	.....	1	1	.....	1	.....
St. Mary's Hospital.....	1	1	1	.....	1	2	.....	1	1	1	1	.....	3	.....
Milwaukee Hospital.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	4	.....
Alms-house.....	.....	.....	.....	.....	.....	.....	.....	2	.....	.....	.....	.....	4	.....
St. Vincent's Asylum.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3	.....
Convent of Notre Dame.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	4	.....
Morgue, 7th ward.....	.....	.....	.....	.....	.....	.....	6	.....	7	5	.....	.....	1	.....
South Side Police Station.....	.....	.....	.....	.....	.....	.....	2	.....	.....	.....	.....	.....	1	.....
Asylum Little Sisters of the Poor.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	5	.....
Elsewhere.....	.....	1	.....	.....	1	1	.....	1	.....	.....	.....	.....	1	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	5	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	13	.7
Total.....	163	147	186	165	130	136	196	228	189	154	134	137	1965	100

TABLE

Showing Sick Cases and Deaths from Scarlet Fever and Diphtheria during the year 1879, by Months and by Wards.

A. BY MONTHS.

1879.	DIPHTHERIA.			1879.	SCARLATINA.		
	Cases.	Deaths.	Per Ct.		Cases.	Deaths.	Per Ct.
January.....	84	20	23.8	January.....	15	..	....
February.....	51	13	25.5	February.....	12	1	8.3
March.....	67	15	23.	March.....	12	..	....
April.....	59	19	33.3	April.....	10	1	10.
May.....	68	17	25.	May.....	12	2	16.7
June.....	56	11	19.5	June.....	4	1	25.
July.....	51	10	19.6	July.....	4	1	25.
August.....	58	13	22.5	August.....	3	..	....
September.....	159	31	19.5	September.....	2	..	....
October.....	145	21	14.5	October.....	8	..	....
November.....	125	22	17.6	November.....	13	..	....
December.....	89	20	22.5	December.....	25	3	12.
Total.....	1012	212	20.9	Total.....	120	9	7.5

B. BY WARDS.

First.....	59	15	25.4	First.....	18	1	5.6
Second.....	49	10	20.4	Second.....	12	2	16.7
Third.....	32	5	15.6	Third.....	7	..	....
Fourth.....	60	9	15.	Fourth.....	21	1	4.8
Fifth.....	149	30	20.1	Fifth.....	24	1	4.2
Sixth.....	53	8	15.1	Sixth.....	1	..	....
Seventh.....	38	11	29.	Seventh.....	8	1	12.5
Eighth.....	194	42	21.7	Eighth.....	12	2	16.7
Ninth.....	60	12	20.	Ninth.....	2	..	....
Tenth.....	30	4	13.3	Tenth.....	5	..	....
Eleventh.....	155	33	21.3	Eleventh.....	3	1	33.3
Twelfth.....	120	28	23.3	Twelfth.....	6	..	....
Thirteenth.....	13	5	38.5	Thirteenth.....	1	..	....

In 1877—Of Scarlatina cases 24 per cent. proved fatal.

In 1878— " " 20 " " " "

In 1879— " " 7.5 " " " "

In 1877—Of Diphtheria " 24 " " " "

In 1878— " " 26 " " " "

In 1879— " " 20.9 " " " "

In 1877—Of Small Pox " 28 " " " "

In 1878— " " 15 " " " "

In 1879 there were no Small Pox deaths nor cases in this city.

RATE OF MORTALITY

*In various American Cities, compiled from the available returns for the years
1877, 1878 and 1879.*

AMERICAN.	Population.	Ratio of Deaths Per 1,000		
		1877.	1878.	1879.
Milwaukee.....	122,080	16.7	14.2	15.8
St. Louis.....	501,488	11.6	17.8	12.33
Cincinnati.....	280,000	16.4	15.8	
Cleveland.....	162,000	18.8	18.21	15.8
Providence.....	103,000	19.4	19.4	19.96
Philadelphia.....	850,856	19.5	18.9	17.17
Chicago.....	440,000	19.5	18.4	17.23
Baltimore.....	355,000	20.1	25.4	19.30
Boston.....	350,000	20.5	20.5	19.72
San Francisco.....	300,000	20.9	17.3	14.1
Brooklyn.....	527,830	21.3	21.5	20.049
Richmond.....	75,000	23.7	18.4	
New York.....	1,079,020	24.0	24.5	25.82
New Orleans.....	210,000	25.5	31.9	24.39
Washington.....	160,000	28.3	25.6	24.63
Charleston.....	48,956	35.4	31.8	
Syracuse.....	54,807	13.1	13.7	13.1

The above table, although it is not exhaustive, nor even very extensive, may be regarded as representative. Milwaukee has a record in it, of which she may well be proud.

COMPARATIVE MORTALITY BY CONSUMPTION.

	Total Deaths.	Consumption.	Per Ct.
1869-70, April 1.....	1,249	93	7.4
1870-71, ".....	1,655	143	8.6
1871-72, ".....	1,743	105	6
1872-73, ".....	2,115	115	5.4
1873, Jan. 1 to Dec. 1.....	2,026	136	6.7
1874, ".....	2,073	136	6.6
1875, ".....	1,651	117	7.1
1876, ".....	2,271	127	5.6
1877, ".....	2,243	189	8.4
1878, ".....	1,774	175	9.9
1879, ".....	1,965	170	8.6

TABLE

Showing the Death ratio per 1000 of population per year for last 10½ years.

Estimated Population..	1869	1870	1871	1872	1873	1874	1875	1876	1877	1878	1879
Deaths by Months.....	70000	U. S. Cen's. 71440	77000	83000	School Cen's. 90000	95000	State Cen's 100775	111000	122980	123600	124000
January.....	....	90	113	175	143	116	137	108	221	126	163
February....	....	95	100	155	150	122	117	140	192	132	147
March.....	....	90	98	163	123	114	149	179	217	139	186
April.....	....	87	110	192	115	155	159	150	159	142	165
May.....	....	86	107	152	161	140	122	152	179	113	130
June.....	....	113	100	129	237	162	106	145	159	106	136
July.....	141	220	103	222	172	228	149	198	226	170	196
August.....	155	200	169	298	236	264	184	299	195	246	228
September..	200	170	176	285	258	240	181	257	179	182	189
October....	189	191	147	146	211	203	130	189	169	141	256
November..	142	148	152	121	137	140	118	236	168	137	134
December..	142	129	208	137	183	171	130	208	179	140	137
Total by Yrs	969	1519	1583	2185	2026	2055	1682	2261	2243	1774	1965
Rato per 1000	27.7	21.3	19.1	26.3	22.5	21.6	16.7	20.0	18.0	14.35	15.85

From this table it will be seen that the decrease in the death ratio of Milwaukee has been pretty constant during the decade. The decrease in 1875 was very marked, but was not maintained during the two subsequent years. In ten years only 1875 and 1878 show a lower death rate than that of last year.

TABLE

Exhibiting the principal causes of disease, with the number and relative per cent. to all deaths, and the deaths from all causes by ages, male and female, and the comparative per cent. of total number, in 1877, 1878 and 1879.

	Cholera Infantum.	Violence.	Meningitis.	Diarrhoea.	Diphtheria.	Still born and pre-mature births.	Scarlet Fever.	Consumption.	Convulsions.	Small Pox.	Pneumonia.	Remaining causes.
1877—No.....	52	59	68	70	99	171	171	189	267	274	46	823
1878— "	65	67	66	58	103	171	26	175	254	13	84	776
1879— "	83	78	49	57	212	198	9	170	247	--	117	745
1877—Per cent....	2.3	2.6	.3	3.1	4.4	7.7	7.7	8.4	11.9	12.2	2.1	36.7
1878— " "	3.6	3.7	3.7	3.3	5.8	9.6	1.4	9.9	14.3	.7	4.7	44.0
1879— " "	4.2	4	2.5	2.9	10.8	10.1	.5	8.6	12.6	...	6	37.8

1877—Total Adults, 734 of 2243 or 32.7 per cent.

1878— " " 638 of 1774 or 36 per cent.

1879— " " 641 of 1965 or 32.6 per cent.

1877— " Minors, 1509 of 2243 or 67.3 per cent.

1878— " " 1206 of 1774 or 64 per cent.

1879— " " 1324 of 1965 or 67.4 per cent.

	1879-1878-1877			1879-1878-1877.			1879-1878-1877.			1879-1878-1877.		
	Males.			Females.			Deaths.			Per cent.		
Under 1 year.....	18.4	18.6	18.0	15.8	4.9	15.8	673	597	757	34.2	33.5	33.8
From 1 to 5.....	10.2	9.7	11.3	9.4	3.9	10.4	387	326	487	19.6	18.6	21.7
" 5 to 20.....	6.3	5.3	5.3	7.1	6.9	6.5	263	215	265	13.4	12.2	11.8
" 20 to 30.....	3.3	2.9	3.5	3.3	4.2	4.2	130	125	172	6.6	7.1	7.7
" 30 to 40.....	2.7	2.8	3.1	2.9	2.5	2.2	111	94	118	5.6	5.3	5.3
" 40 to 50.....	2.1	3.3	2.5	1.7	2.1	1.9	76	96	97	3.8	5.4	4.3
" 50 to 60.....	3.4	3.5	3.9	2.4	3.4	2.2	113	125	137	5.8	6.9	6.1
" 60 to 70.....	3.0	2.6	2.7	2.2	2.9	1.7	102	99	99	5.2	5.5	4.4
" 70 to 80.....	2.2	1.6	1.9	1.9	1.6	1.6	80	57	79	4.1	3.2	3.5
Over 80 years.....	0.9	1.0	0.6	0.8	1.3	0.7	30	40	32	1.7	2.3	1.4
1877—Per cent.....	Males, 52.8			Females 47.2			Total 2243			100		
1878— "	" 51.3			" 48.7			" 1774			100		
1879— "	" 52.4			" 47.5			" 1965			100		

TABLE

*Showing the Death Rate by Nativities of Deceased Persons during the year
1877.*

Of 2243 total deaths there were born in

Wisconsin.....	66.8 per cent.	Norway.....	0.4 per cent.
Other States.....	6.2 " "	Poland.....	0.3 " "
Germany.....	18.0 " "	Austria.....	0.2 " "
Ireland.....	4.0 " "	Unknown.....	0.2 " "
England.....	1.2 " "	Wales.....	0.1 " "
Holland.....	0.7 " "	France.....	0.1 " "
Bohemia.....	0.7 " "	Switzerland.....	0.1 " "
Canada.....	0.5 " "	Denmark.....	0.1 " "
Scotland.....	0.4 " "		
			100.0

1878.

Of 1774 total deaths there were born in

Milwaukee.....	58.5 per cent.	Poland.....	0.6 per cent.
Wisconsin.....	3.6 " "	Austria.....	0.2 " "
Other States.....	6.0 " "	France.....	0.1 " "
Germany.....	21.8 " "	Switzerland.....	0.4 " "
Ireland.....	3.1 " "	Denmark.....	0.1 " "
England.....	1.2 " "	Belgium.....	0.1 " "
Holland.....	0.3 " "	Italy.....	0.1 " "
Bohemia.....	1.0 " "	China.....	0.1 " "
Canada.....	0.6 " "	Unknown.....	0.3 " "
Scotland.....	0.3 " "		
Norway.....	0.6 " "		
Sweden.....	0.1 " "		
			100.0

1879.

Of 1965 total deaths there were born in

Milwaukee.....	63.5 per cent.	Scandinavia.....	0.4 per cent.
Wisconsin.....	3.3 " "	Scotland.....	0.4 " "
Other States in Union.....	5.9 " "	Switzerland.....	0.3 " "
Germany.....	18.0 " "	Austria.....	0.1 " "
Ireland.....	4.0 " "	Hungary.....	} 0.2 " "
England.....	0.9 " "	France.....	
Holland.....	0.8 " "	Russia.....	
Canada.....	0.5 " "	Unknown.....	0.8 " "
Bohemia.....	0.5 " "		
Poland.....	0.4 " "		
			100.0

RECAPITULATION

By Wards of Complaints entered and Actions taken thereon; Garbage Collections; Confiscations and Inspections by Meat Inspector; General Inspections and Cleaning of Vaults, Etc.

COMPLAINTS.

	Complaints of General Nature.	Insufficient Drainage.	Offal and Garbage.	Filth in Yards and Alleys.	Privy Vaults.	Total Numbers of Complaints.	To Council.	To Board of Pub-Works.	Orders of Commissioner affecting Real Estate.	Loads of Garbage reported Removed.	Special Orders of Commissioner of Health.	Reports on Examinations by Health Inspector.	Confiscations by Meat Inspector.	Examinations by Meat Inspector.	Permits to Clean Privies.	Yards of Night Soil Reported Removed.	Sick Cases Reported to Schools and Public Library.	Recovery Certificates Issued.	Houses Placarded.	Houses Disinfected.
First Ward.....	45	10	25	19	52	124	3	4	7	512	1	41	16	417	53	487	77	43	59	57
Second Ward.....	82	11	27	22	56	198	1	10	10	648	1	53	16	740	124	593	61	43	45	44
Third Ward.....	157	36	8	23	34	357	17	1	19	436	4	56	15	176	51	169	39	24	29	28
Fourth Ward.....	139	40	38	40	101	357	1	5	39	716	4	106	15	345	181	624	81	52	62	59
Fifth Ward.....	61	18	11	68	97	339	41	13	42	378	91	338	140	338	140	447	173	104	135	128
Sixth Ward.....	61	18	7	11	40	137	7	3	15	410	47	37	4	320	60	229	54	33	35	40
Seventh Ward.....	75	16	77	16	36	220	7	5	11	638½	59	59	4	219	87	507	46	24	160	154
Eighth Ward.....	25	22	2	9	35	91	6	3	17	333	1	29	4	119	61	216	206	116	160	154
Ninth Ward.....	29	8	1	2	18	77	1	3	5	333	1	18	3	328	61	173	62	38	50	46
Tenth Ward.....	12	9	7	4	1	34	1	4	5	234	1	6	3	194	15	87	35	21	25	23
Eleventh Ward.....	17	10	1	4	1	37	6	4	5	232	1	8	3	170	18	107	158	88	122	118
Twelfth Ward.....	2	6	.....	2	.....	20	2	2	4	260	.....	5	.....	41	15	120	126	69	97	94
Thirteenth Ward.....	2	.....	.....	2	.....	6	2	2	2	229	.....	1	.....	60	2	53	14	6	97	94
Towns in County.....	12	.....	.....	.....	.....	12	.....	.....	.....	.....	15	2	.....	.....	.....	.....	.....	.....	.....	.....
Totals.....	638	260	505	250	456	1809	86	56	177	5459½	40	522	69	3376	887	3344	1132	651	872	833

METEOROLOGICAL REPORT.

Observations taken at Signal Office in Milwaukee, Wis., during the Month of January, 1879. - Furnished for the use of the Commissioner of Health.

JANUARY. Day and Date.	Barometer, Daily Mean.	Thermometer, Daily Mean.	Relative Humidity, Daily Mean.	Direction of Wind.	Velocity of Wind.			State of Weather.	Rain. Inches.
					7 a. m.	12 m.	9 p. m.		
Wednesday... 1	29.992	9.0	69.3		2	11	23	Fair.....	—
Thursday.... 2	30.212	16.2	71.0	N W	27	30	26	Clear.....	0.00
Friday..... 3	30.357	9.7	72.0	W	19	20	18	Clear.....	0.00
Saturday.... 4	30.371	4.5	71.7	W	11	17	15	Clear.....	0.00
Sunday..... 5	30.347	10.5	73.7	W	12	16	11	Cloudy....	—
Monday..... 6	30.165	15.0	77.3	W	6	13	21	Cloudy....	0.00
Tuesday..... 7	29.935	22.2	77.3	S W	18	18	14	Cloudy....	—
Wednesday... 8	30.042	8.2	71.3	S W	18	21	15	Clear.....	0.00
Thursday.... 9	30.083	7.5	76.7	W	8	19	10	Clear.....	0.00
Friday..... 10	30.227	22.0	76.7	W	6	16	10	Cloudy....	0.00
Saturday.... 11	30.237	26.2	76.3	S W	3	2	6	Hazy.....	0.00
Sunday..... 12	30.040	25.0	78.7	S W	7	18	6	Fair.....	0.00
Monday..... 13	29.914	27.5	77.0	S W	14	2	6	Fair.....	0.00
Tuesday.... 14	30.189	23.2	83.3	W	9	5	8	Cloudy....	0.00
Wednesday... 15	29.962	29.7	85.0	N W	21	24	28	L't Snow..	0.32
Thursday.... 16	30.069	31.7	72.3	E	11	6	6	Clear.....	0.18
Friday..... 17	29.004	25.0	84.0	W	6	8	15	L't Snow..	—
Saturday.... 18	30.128	12.2	76.3	S W	17	19	16	Clear.....	0.00
Sunday..... 19	30.213	9.7	63.7	W	17	16	12	Cloudy....	—
Monday..... 20	30.001	11.7	74.7	W	12	13	13	Cloudy....	—
Tuesday.... 21	29.650	32.5	79.3	N E	12	26	10	Fair.....	—
Wednesday... 22	29.806	31.5	82.3	S W	18	14	14	Cloudy....	0.00
Thursday.... 23	30.192	30.2	66.0	S W	6	13	13	Fair.....	0.00
Friday..... 24	29.773	39.0	70.7	N E	16	13	12	Cloudy....	0.00
Saturday.... 25	30.316	34.2	67.7	S E	28	15	0	Clear.....	0.00
Sunday..... 26	29.951	37.5	71.0	W	17	23	24	Cloudy....	0.00
Monday..... 27	29.722	40.7	79.3	W	16	11	10	Cloudy....	—
Tuesday.... 28	30.238	37.0	73.3	N W	12	10	4	Cloudy....	0.00
Wednesday... 29	30.322	38.0	64.7	N W	4	7	15	Fair.....	0.00
Thursday.... 30	30.287	34.0	61.0	W	9	11	11	Clear.....	0.00
Friday..... 31	30.193	28.7	74.3	N W	12	14	23	Fair.....	0.01
Monthly Means..	30.092	21.6	74.1	-----	-----	-----	-----	-----	-----

Highest Barometer.....39.488—(25th)
 Lowest ".....29.483—(21st)
 Monthly range of Barometer...1.005
 Highest Temperature.....40°—(27th
 28th and 29th)
 Lowest Temperature.....20°—(3d)
 Monthly range of Temperature. 66°—
 Greatest daily range of " 27.0°—(10th)
 Least daily range of " 8°—(26th)
 Mean of Maximum " 29.9°
 Mean of Minimum " 13.4°
 Mean daily range of " 16.5°
 Total amount of Precipitation—0.51 inches.
 Prevailing wind—W.
 Total movement of wind.....—9826 miles.

Maximum velocity of wind and direc-
 tion.....41 miles west(2d)
 Number of foggy days.....0
 Number of clear days.....7
 Number of fair days.....14
 Number of cloudy days on which
 rain or snow fell.....5
 Number of cloudy days on which no
 rain or snow fell.....5
 Total Number of days on which
 rain or snow fell.....11
 Date of Auroras.....0
 Date of Solar Halos.....0
 Date of Lunar Halos.....1st
 Date of Frost.....23d, 29th, 30th, 31st

NOTE—The barometer is reduced to sea-level and freezing point, the elevation is 695 feet above mean sea-level. A dash in the rain column signifies the amount of precipitation is less than 0.01 inches.

WM. FINN, *Sergeant Signal Corps, U. S. A.*

*Observations taken at Signal Office in Milwaukee, Wis., during the
Month of February, 1879, furnished for the use of
the Board of Health.*

FEBRUARY.		Barometer, Daily Mean.	Thermometer Daily Mean.	Relative Humidity, Daily Mean.	Direction of Wind.	Velocity of Wind.			State of Weather.	Rain. Inches.
Day and Date.						7 a. m.	2 p. m.	9 p. m.		
Saturday.....	1	30.356	18.7	69.3	N W	16	17	12	Clear	0.00
Sunday	2	30.140	29.7	68.3	N W	6	8	11	Clear	0.00
Monday.....	3	30.007	31.7	71.7	W	20	16	0	Clear	—
Tuesday.....	4	29.853	34.5	77.0	S E	24	13	11	Lt. Snow.	0.21
Wednesday ..	5	29.904	26.7	69.0	N W	18	10	4	Fair.....	0.00
Thursday.....	6	29.963	25.0	68.0	S W	9	11	9	Fair.....	0.00
Friday.....	7	30.259	28.2	66.3	W	4	7	3	Clear.....	0.00
Saturday.....	8	30.181	34.0	72.7	S W	8	19	19	Fair.....	0.00
Sunday.....	9	30.353	30.5	66.3	E	7	9	14	Cloudy.....	0.00
Monday.....	10	29.798	43.2	68.3	S	15	6	7	Cloudy.....	0.03
Tuesday.....	11	20.720	24.2	82.3	N	21	25	16	Hy. Snow.	0.60
Wednesday ..	12	29.891	16.2	77.3	N W	4	23	14	Cloudy.....	0.01
Thursday.....	13	30.245	0.5	72.3	W	11	18	24	Clear.....	0.00
Friday.....	14	30.343	2.0	64.0	W	18	18	4	Clear.....	0.00
Saturday.....	15	30.144	24.5	82.0	S W	5	16	6	Lt. Snow.	0.00
Sunday.....	16	30.323	22.0	75.7	N E	10	11	13	Cloudy.....	0.00
Monday.....	17	30.311	25.7	75.0	N E	14	15	10	Cloudy.....	—
Tuesday.....	18	30.254	31.7	76.3	Calm.	0	9	9	Cloudy.....	—
Wednesday ..	19	30.010	27.7	85.0	N W	8	19	22	Lt. Snow.	0.26
Thursday.....	20	30.513	12.5	68.7	N W	12	10	8	Clear.....	0.00
Friday.....	21	29.963	20.0	78.0	S E	8	25	13	Cloudy.....	0.01
Saturday.....	22	29.752	31.7	69.7	W	21	30	17	Clear.....	0.00
Sunday.....	23	29.887	16.7	65.0	W	24	26	8	Clear.....	0.00
Monday.....	24	29.721	27.5	75.7	E	4	16	20	Lt. Snow.	0.08
Tuesday.....	25	29.634	25.0	87.7	N	3	14	12	Lt. Snow.	0.06
Wednesday ..	26	30.230	1.2	73.7	N W	25	22	17	Cloudy.....	0.26
Thursday.....	27	30.498	10.0	56.3	N W	8	3	2	Cloudy.....	0.00
Friday.....	28	30.060	32.5	82.3	S	13	30	13	Cloudy.....	0.01
Monthly Means..		30.083	23.7	73.0						

Highest Barometer.....	30.531	(27th).	direction—36 miles N. W., N., W. & W.,	
Lowest Barometer.....	29.544	(25th),	8th, 11th, 22d, 23d, respectively.	
Monthly range of Barometer.....	1.037.		Number of foggy days.....	0
Highest Temperature.....	48°	(10th).	Number of clear days.....	4
Lowest Temperature.....	12°	(27th).	Number of fair days.....	13
Monthly range of Temperature.....	60°		Number of cloudy days on which rain	
Greatest daily r'ge of ".....	33.0°	(27th).	or snow fell.....	9
Least daily range of ".....	8°	(17th).	Number of cloudy days on which no	
Mean of Maximum.....	32.6°		rain or snow fell.....	2
Mean of Minimum.....	14.7°		Total number of days on which rain	
Mean daily range of ".....	17.9°		or snow fell.....	16
Total amount of Precipitation.....	1.62 inches.		Date of Auroras.....	0
Prevailing wind.....	Northwest.		Date of Solar Halos.....	0
Total movement of wind.....	8723 miles.		Date of Lunar Halos.....	2nd and 5th.
Maximum velocity of wind and			Date of Frost.....	8th.

WM. FINN, *Sergeant Signal Corps, U. S. A.*

METEOROLOGICAL TABLE.

Observations taken at Signal Office in Milwaukee, Wis., during the Month of March, 1879. Furnished for the use of the Commissioner of Health.

MARCH.	Day and Date.	Barometer, Daily Mean.	Thermometer, Daily Mean.	Relative Humidity, Daily Mean.	Direction of Wind.	Velocity of Wind.			State of Weather.	Rain. Inches.
						7 a. m.	2 p. m.	9 p. m.		
Saturday.....	1	30.445	28.5	73.7	NW	18	14	6	Cloudy...	0.00
Sunday.....	2	30.586	25.5	79.7	NE	15	15	8	Cloudy...	0.00
Monday.....	3	30.343	30.5	75.3	S	7	11	19	Fair.....	0.00
Tuesday.....	4	30.283	39.2	66.3	W	24	20	14	Clear.....	0.00
Wednesday....	5	30.250	39.0	73.3	SE	17	15	14	Lt. Rain...	0.07
Thursday.....	6	30.120	41.0	51.0	W	10	18	13	Clear.....	0.02
Friday.....	7	30.061	39.2	69.3	E	17	14	12	Cloudy....	0.00
Saturday.....	8	29.707	55.0	71.3	SW	6	6	16	Clear.....	—
Sunday.....	9	29.745	55.2	65.0	SW	19	16	16	Cloudy....	0.18
Monday.....	10	29.887	52.5	45.0	SW	18	16	20	Clear.....	0.00
Tuesday.....	11	30.312	39.5	56.3	NW	20	14	12	Clear.....	0.00
Wednesday....	12	29.978	45.0	65.0	W	4	19	26	Cloudy....	—
Thursday.....	13	29.947	37.0	72.0	NW	15	10	9	Cloudy....	0.02
Friday.....	14	30.027	15.7	71.3	NW	28	20	31	Clear.....	0.01
Saturday.....	15	30.136	14.0	57.3	SW	21	20	18	Clear.....	0.00
Sunday.....	16	30.139	17.7	66.3	NW	7	8	7	Fair.....	0.00
Monday.....	17	30.076	19.0	66.3	W	10	18	17	Fair.....	0.00
Tuesday.....	18	30.144	21.7	60.7	W	10	15	9	Clear.....	0.00
Wednesday....	19	30.116	28.7	66.0	W	10	22	14	Fair.....	0.00
Thursday.....	20	30.031	31.7	73.0	SE	10	13	4	Cloudy....	—
Friday.....	21	30.117	31.7	69.7	NE	10	12	11	Cloudy....	0.00
Saturday.....	22	29.974	31.0	82.3	N	14	10	10	Lt. Snow...	0.25
Sunday.....	23	29.877	41.5	68.3	S	5	15	30	Cloudy....	0.04
Monday.....	24	30.023	39.2	69.7	SE	28	15	8	Cloudy....	0.02
Tuesday.....	25	30.017	41.7	71.3	SE	14	20	18	Cloudy....	0.00
Wednesday....	26	29.702	39.5	85.3	NE	8	12	4	Cloudy....	0.00
Thursday.....	27	29.984	40.0	85.7	SE	4	15	8	Foggy....	0.00
Friday.....	28	29.769	50.0	76.3	SW	13	11	11	Lt. Rain...	0.08
Saturday.....	29	29.769	41.7	70.3	N	12	9	11	Fair.....	—
Sunday.....	30	29.919	36.2	65.0	NE	14	9	3	Fair.....	0.00
Monday.....	31	29.886	40.0	70.7	SE	3	10	5	Cloudy....	—
Monthly Means..		30.044	35.8	68.8	-----	-----	-----	-----	-----	-----

Highest Barometer.....	30.622 (2nd).	direction.....	44 miles South, 24th.
Lowest Barometer.....	29.599 (28th).	Number of foggy days.....	1
Monthly range of Barometer..	1.063.	Number of clear days.....	6
Highest Temperature.....	68° (10th).	Number of fair days.....	12
Lowest Temperature.....	8° (15th).	Number of cloudy days on which rain or snow fell.....	8
Monthly range of Temperature.	60°.	Number of cloudy days on which no rain or snow fell.....	5
Greatest daily range of ".....	28.0° (8th).	Total number of days on which rain or snow fell.....	15
Least daily range of ".....	6° (30th).	Date of Auroras.....	0
Mean of Maximum ".....	43.2°.	Date of Solar Halos.....	0
Mean of Minimum ".....	28.5°.	Date of Lunar Halos.....	0
Mean daily range of ".....	14.6°.	Date of Frost.....	3d, 6th, 25th and 31st.
Total amount of Precipitation.	0.92 inches.		
Prevailing wind.....	West.		
Total movement of wind.....	9960 miles.		
Maximum velocity of wind and			

NOTE—The barometer is reduced to sea-level and freezing point, the elevation is 695 feet above mean sea-level. A dash in the rain column signifies the amount of precipitation is less than 0.01 inches.

WM. FINN, *Sergeant Signal Corps, U. S. A.*

METEOROLOGICAL REPORT.

Observations taken at Signal Office in Milwaukee, Wis., during the Month of April, 1879. Furnished for the use of Commissioner of Health.

APRIL.	Day and Date.	Barometer, Daily Mean.	Thermometer, Daily Mean.	Relative Humidity, Daily Mean.	Direction of Wind.	Velocity of Wind.			State of Weather.	Rain. Inches.
						7 a. m.	2 p. m.	9 p. m.		
Tuesday.....	1	29.902	34.5	58.3	NW	19	22	6	Clear.....	0.00
Wednesday....	2	29.927	23.5	86.3	NE	14	22	14	H'y snow.	0.17
Thursday.....	3	30.026	25.7	87.0	NW	23	30	18	Fair.....	0.00
Friday.....	4	30.083	33.5	62.7	NW	14	16	4	Clear.....	0.00
Saturday.....	5	30.142	36.2	61.3	SE	2	10	7	Clear.....	0.00
Sunday.....	6	29.944	45.0	57.0	SW	10	17	13	Cloudy...	0.00
Monday.....	7	30.161	40.0	61.3	E	14	9	4	Clear.....	0.00
Tuesday.....	8	30.034	46.5	59.0	SE	6	18	9	Clear.....	0.00
Wednesday....	9	29.563	44.5	82.0	SE	10	20	12	Cloudy...	0.10
Thursday.....	10	29.563	39.7	82.0	E	12	15	28	L't Rain..	1.58
Friday.....	11	30.188	37.5	62.3	NE	12	13	2	Clear.....	0.00
Saturday.....	12	30.055	44.0	67.0	SE	2	16	6	Cloudy...	0.00
Sunday.....	13	29.825	42.0	80.3	NE	5	21	7	Cloudy...	0.12
Monday.....	14	29.821	37.2	68.3	N	14	20	15	Clear.....	0.00
Tuesday.....	15	29.886	39.0	64.6	N	18	18	8	Clear.....	0.00
Wednesday....	16	29.986	37.2	78	N	12	20	18	Clear.....	0.00
Thursday.....	17	30.092	37.7	64.0	N	17	21	10	Clear.....	0.00
Friday.....	18	30.102	41.0	65.7	E	8	8	4	Clear.....	0.00
Saturday.....	19	30.128	43.0	56.3	N	8	10	6	Clear.....	0.00
Sunday.....	20	30.165	42.7	58.3	NE	6	8	2	Clear.....	0.00
Monday.....	21	30.263	46.2	56.7	NE	2	8	4	Clear.....	0.00
Tuesday.....	22	30.278	55.0	54.0	SE	4	17	10	Clear.....	0.00
Wednesday....	23	30.171	55.5	62.7	SE	3	19	2	Clear.....	0.00
Thursday.....	24	29.838	62.5	68.3	SE	8	17	14	Cloudy...	0.00
Friday.....	25	29.769	62.0	64.7	W	20	12	6	Cloudy...	0.03
Saturday.....	26	29.773	63.7	71.3	SE	7	13	17	Cloudy...	0.00
Sunday.....	27	29.854	56.5	46.0	W	11	14	22	Fair.....	0.04
Monday.....	28	30.001	55.7	47.0	W	10	16	6	Clear.....	0.00
Tuesday.....	29	30.008	49.0	55.3	W	12	28	12	Fair.....	0.00
Wednesday....	30	30.150	41.2	47.3	NE	12	20	4	Clear.....	0.00
Monthly Means..		29.990	43.9	64.5						

Highest Barometer.....	30.359—(22 d)	Number of foggy days.....	0
Lowest ".....	29.053—(10th)	Number of clear days.....	15
Monthly range of Barometer...1.306		Number of fair days.....	10
Highest Temperature.....73°—(25th)		Number of cloudy days on which rain or snow fell.....	4
Lowest ".....13°—(3d)		Number of cloudy days on which no rain or snow fell.....	1
Monthly Range of Temp'ture..60°—(28th)		Total number of days on which rain or snow fell.....	7
Greatest daily range of ".....29°—(14&16)		Date of Auroras.....	0
Least daily range of ".....5.0°—(14&16)		Date of Solar Halos.....	(12th)
Mean of Maximum ".....51.0°		Date of Lunar Halos.....	0
Mean of Minimum ".....35.8°		Date of Frost.....11, 12, 16, 17, 18, 19 and 21	0
Total amount of Precipitation—2.04 inches.			
Prevailing wind—N E.			
Total movement of wind.....8548 miles			
Maximum velocity of wind and direction.....40 miles west (3d)			

NOTE—The barometer is reduced to sea-level and and freezing point, the elevation is 695 feet above mean sea-level. A dash in the rain column signifies the amount of precipitation is less than 0.01 inches.

WM. FINN, *Sergeant Signal Corps, U. S. A.*

METEOROLOGICAL TABLE.

Observations taken at Signal Office in Milwaukee, Wis. during the
Month of May, 1879. Furnished for the use of the
Commissioner of Health.

MAY. Day and Date.	Baromet.r, Daily Mean.	Thermometer, Daily Mean.	Relative Humidi- ty, Daily Mean.	Direction of Wind.	Velocity of Wind.			State of Weather.	Rain. Inches.
					7 a. m.	2 p. m.	9 p. m.		
Thursday..... 1	30.149	41.7	46.3	E	6	7	3	Clear.....	0.00
Friday..... 2	30.075	44.2	48.0	S E	4	12	7	Clear.....	0.00
Saturday..... 3	29.773	45.7	71.0	S E	6	0	10	Lt. Rain...	0.27
Sunday..... 4	29.409	60.7	46.3	W	10	30	20	Fair.....	0.06
Monday..... 5	29.911	46.0	57.7	N W	26	21	14	Cloudy.....	0.00
Tuesday..... 6	30.306	41.0	65.3	E	16	7	9	Cloudy.....	0.00
Wednesday... 7	30.398	44.2	54.7	N	8	10	2	Clear.....	0.00
Thursday..... 8	30.375	48.7	54.7	S E	4	10	2	Fair.....	0.00
Friday..... 9	30.255	52.0	61.7	S E	5	19	7	Clear.....	0.00
Saturday..... 10	29.948	62.7	56.3	S E	6	20	22	Cloudy.....	—
Sunday..... 11	29.718	50.2	77.0	S E	16	15	6	Cloudy.....	0.33
Monday..... 12	29.797	68.0	68.3	S	12	10	12	Fair.....	0.00
Tuesday..... 13	29.831	61.0	69.7	S E	5	16	2	Clear.....	0.00
Wednesday... 14	29.927	44.2	89.3	N	15	24	17	Lt. Rain...	0.38
Thursday..... 15	29.969	47.5	70.3	N	23	16	9	Clear.....	0.01
Friday..... 16	30.013	53.2	60.7	E	2	8	6	Clear.....	0.00
Saturday..... 17	30.039	57.2	61.0	S E	4	10	5	Clear.....	0.00
Sunday..... 18	30.067	45.5	79.3	N E	17	12	7	Cloudy.....	0.00
Monday..... 19	29.855	56.4	66.3	E	4	9	6	Hazy.....	0.00
Tuesday..... 20	29.844	59.0	58.0	N E	9	19	18	Clear.....	0.00
Wednesday... 21	30.184	50.5	59.3	N	22	18	15	Fair.....	0.00
Thursday..... 22	30.293	52.5	49.0	N E	7	10	7	Clear.....	0.00
Friday..... 23	30.207	55.7	58.3	S E	9	10	13	Fair.....	—
Saturday..... 24	29.925	71.0	53.3	S W	17	9	10	Cloudy.....	—
Sunday..... 25	30.009	45.7	82.9	N E	22	25	22	Lt. Rain...	0.80
Monday..... 26	30.110	46.7	70.3	N E	17	12	4	Cloudy.....	0.06
Tuesday..... 27	30.145	56.0	65.3	W	2	5	6	Cloudy.....	—
Wednesday... 28	30.045	54.5	80.3	S E	5	12	7	Cloudy.....	—
Thursday..... 29	29.683	74.0	62.7	S	10	18	12	Clear.....	0.00
Friday..... 30	29.681	74.0	60.0	S W	17	26	6	Fair.....	0.00
Saturday..... 31	29.919	49.2	82.0	N E	8	28	20	Cloudy.....	0.38
Monthly Means..	29.997	53.8	64.0	-----	-----	-----	-----	-----	-----

Highest Barometer.....	30.442 (8th).	direction.....	40 miles west, (4&30)
Lowest Barometer.....	29.451 (4th).	Number of foggy days.....	0
Monthly range of Barometer..	0.991.	Number of clear days.....	7
Highest Temperature.....	85° (29th).	Number of fair days.....	13
Lowest Temperature.....	32° (2d).	Number of cloudy days on which rain	
Monthly range of Temperature.	53°.	or snow fell.....	8
Greatest daily range of "	35.0° (20th).	Number of cloudy days on which no	
Least daily range of "	9° (26th).	rain or snow fell.....	3
Mean of Maximum.....	64.1°.	Total number of days on which rain	
Mean of Minimum.....	44.7°.	or snow fell.....	13
Mean daily range of "	19.3°.	Date of Auroras.....	0
Total amount of Precipitation.	2.29 inches.	Date of Solar Halos.....	(30th)
Prevailing wind.....	S. E.	Date of Lunar Halos.....	0
Total movement of wind.....	8832 miles.	Date of Frost.....	1, 2, 7 and 8
Maximum velocity of wind and			

NOTE—The barometer is reduced to sea-level and freezing point, the elevation is 695 feet above mean sea-level. A dash in the rain column signifies the amount of precipitation is less than 0.01 inches.

WM. FINN, *Sergeant Signal Corps, U. S. A.*

METEOROLOGICAL REPORT.

Observations taken at Signal Office in Milwaukee, Wis., during the Month of June, 1879, Furnished for the use of the Commissioner of Health.

JUNE. Day and Date.	Barometer, Daily Mean.	Thermometer Daily Mean.	Relative Humidity, Daily Mean.	Direction of Wind.	Velocity of Wind.			State of Weather.	Rain. Inches.
					7 a. m.	2 p. m.	9 p. m.		
Sunday.....1	30.113	44.7	84.3	N	18	15	8	Cloudy...	0.25
Monday.....2	30.077	52.0	59.0	E	6	6	2	Cloudy...	0.00
Tuesday.....3	29.905	57.0	57.0	E	3	6	6	Clear.....	0.00
Wednesday...4	29.713	70.0	63.0	W	11	9	10	Cloudy...	0.01
Thursday.....5	29.928	53.5	55.0	N E	16	8	4	Fair.....	0.00
Friday.....6	30.158	46.2	54.7	N	19	14	7	Fair.....	0.00
Saturday.....7	30.190	49.2	61.7	E	8	8	5	Clear.....	0.00
Sunday.....8	30.016	60.7	62.7	S E	6	16	12	Clear.....	0.00
Monday.....9	29.723	71.2	62.0	S E	6	18	24	Fair.....	0.00
Tuesday.....10	29.743	73.5	53.0	W	20	16	6	Clear.....	0.01
Wednesday...11	29.800	68.2	75.0	S W	9	10	9	Lt. Rain..	0.00
Thursday.....12	30.002	62.5	70.7	N	12	12	8	Fair.....	0.00
Friday.....13	29.970	58.2	70.0	E	9	7	2	Fair.....	0.00
Saturday.....14	29.491	66.7	89.3	S W	12	4	9	Cloudy...	0.76
Sunday.....15	29.503	59.0	88.3	N	18	7	28	Th'r St'm.	0.93
Monday.....16	30.055	49.0	59.0	N E	20	17	10	Clear.....	0.00
Tuesday.....17	30.303	53.0	58.3	N E	12	7	5	Clear.....	0.00
Wednesday...18	30.304	59.0	55.7	N E	8	8	1	Clear.....	0.00
Thursday.....19	30.201	60.7	61.7	S E	3	10	2	Fair.....	0.00
Friday.....20	30.000	65.7	65.0	S E	6	18	9	Cloudy...	0.00
Saturday.....21	29.949	67.5	88.0	S E	11	3	6	Lt. Rain..	0.39
Sunday.....22	30.008	73.5	66.3	S E	10	17	4	Clear.....	0.00
Monday.....23	29.939	74.7	64.7	S	5	16	8	Clear.....	0.00
Tuesday.....24	29.900	68.7	73.7	S E	6	21	7	Fair.....	0.00
Wednesday...25	29.907	66.2	87.7	E	3	6	6	Cloudy...	0.17
Thursday.....26	29.851	68.2	88.7	E	5	17	4	Foggy.....	0.00
Friday.....27	29.827	66.5	69.7	N	7	8	4	Cloudy...	0.09
Saturday.....28	29.775	65.7	77.7	E	8	6	3	Cloudy...	0.05
Sunday.....29	29.967	64.2	66.0	N E	10	5	3	Clear.....	0.00
Monday.....30	30.063	64.5	71.0	S E	4	8	4	Clear.....	0.00
Monthly Means..	29.946	62.0	68.6	-----	-----	-----	-----	-----	-----

Highest Barometer.....30.369 (18th).
 Lowest Barometer.....29.297 (15th).
 Monthly range of Barometer. 1.072.
 Highest Temperature.....85° (23rd).
 Lowest Temperature.....40° (2nd).
 Monthly range of Temperature. 45°.
 Greatest daily range of " 29° (14th).
 Least daily range of " 6° (1st).
 Mean of Maximum " 69.5°.
 Mean of Minimum " 54.1°.
 Mean daily range of " 15.4°.
 Total amount of Precipitation. 2.66 inches.
 Prevailing wind.....Southeast.
 Total movement of wind.....6753 miles.
 Maximum velocity of wind and

direction.....56 miles W., S., W., 10th.
 Number of foggy days.....1
 Number of clear days.....8
 Number of fair days.....11
 Number of cloudy days on which rain or snow fell.....9
 Number of cloudy days on which no rain or snow fell.....2
 Total number of days on which rain or snow fell.....14
 Date of Auroras.....0
 Date of Solar Halos.....20th.
 Date of Lunar Halos.....0
 Date of Frost.....2nd and 7th.

NOTE.—The barometer is reduced to sea-level and freezing point, the elevation is 695 feet above mean sea-level. A dash in the rain column signifies the amount of precipitation is less than 0.01 inches.

WM. FINN, *Sergeant Signal Corps, U. S. A.*

METEOROLOGICAL REPORT.

Observations taken at Signal Office in Milwaukee, Wis., during the Month of July 1879. Furnished for the use of the Commissioner of Health.

JULY. Day and Date.	Barometer, Daily Mean.	Thermometer, Daily Mean.	Relative Humidity, Daily Mean.	Direction of Wind.	Velocity of Wind.			State of Weather.	Rain. Inches.
					7 a. m.	a p. m.	9 p. m.		
Tuesday..... 1	30.026	69.2	73.0	S E	8	20	8	Clear.....	0.00
Wednesday... 2	29.962	73.0	68.3	S	4	10	8	Fair.....	—
Thursday.... 3	29.775	78.2	77.0	S W	16	32	8	Cloudy...	1.07
Friday..... 4	30.091	63.7	71.3	N	10	10	8	Clear.....	0.00
Saturday.... 5	30.119	68.2	68.3	S E	3	7	1	Cloudy...	0.00
Sunday..... 6	29.85	69.0	75.0	S	8	15	11	Cloudy...	0.95
Monday..... 7	29.738	67.2	93.0	S	12	12	4	L't Rain...	0.92
Tuesday.... 8	29.879	74.7	59.7	W	13	17	5	Clear.....	0.00
Wednesday... 9	29.844	75.2	72.7	S W	9	14	4	Clear.....	0.00
Thursday.... 10	29.683	78.5	77.0	N E	22	12	2	T'r Storm	0.2
Friday..... 11	29.639	71.7	79.3	N	20	15	8	Clear.....	0.00
Saturday.... 12	29.782	72.0	74.3	S E	3	12	6	Clear.....	0.00
Sunday..... 13	29.832	76.2	74.7	S W	6	12	4	Clear.....	0.00
Monday..... 14	29.904	83.7	67.0	S W	8	20	5	Clear.....	0.00
Tuesday.... 15	29.910	83.2	65.0	N W	4	20	7	Fair.....	0.00
Wednesday... 16	29.958	71.7	69.7	E	9	8	3	Fair.....	0.00
Thursday.... 17	30.098	63.2	69.3	N E	11	13	8	Clear.....	0.00
Friday..... 18	30.111	62.5	75.0	N E	12	10	4	Clear.....	0.00
Saturday.... 19	30.039	66.7	74.0	S E	2	15	7	Clear.....	0.00
Sunday..... 20	29.993	72.5	69.0	S W	3	15	9	Clear.....	0.00
Monday..... 21	29.921	70.7	66.0	S E	7	16	4	Fair.....	0.00
Tuesday.... 22	29.776	73.0	80.7	E	6	6	4	Clear.....	—
Wednesday... 23	29.856	66.5	77.7	N	10	19	18	Foggy.....	0.01
Thursday.... 24	29.919	64.2	83.7	N E	14	11	6	Clear.....	0.01
Friday..... 25	29.793	70.7	70.0	N W	2	21	7	Cloudy...	0.00
Saturday.... 26	29.753	71.2	56.3	W	13	18	9	Clear.....	—
Sunday..... 27	29.845	73.2	59.7	W	12	18	5	Clear.....	0.00
Monday..... 28	29.818	71.7	64.7	W	14	11	12	L't Rain..	0.15
Tuesday.... 29	29.967	68.2	65.3	E	9	10	3	Clear.....	0.00
Wednesday... 30	29.988	75.5	58.0	N W	6	10	6	Clear.....	0.00
Thursday.... 31	29.986	74.2	65.3	S E	6	24	12	Clear.....	0.00
Monthly Means..	29.899	71.8	71.0	.....	.....	.....	.....	.....	.....

Highest Barometer..... 30.177—(5th)
 Lowest "..... 29.523—(11th)
 Monthly range of Barometer..... 0.654
 Highest Temperature..... 91°—(10th
 14th and 15th)
 Lowest Temperature..... 53°—(19th)
 Monthly range of Temperature..... 38°—
 Greatest daily range of "..... 23°—(19th)
 Least daily range of "..... 7°—(22&24)
 Mean of Maximum "..... 79.9°
 Mean of Minimum "..... 64.2°
 Mean daily range of "..... 15.7°
 Total amount of Precipitation—3.59 inches.
 Prevailing wind—S. W.
 Total movement of wind.....—7351 miles.

Maximum velocity of wind and direc-
 tion..... 38 miles S. W. N. W(3d)
 Number of foggy days..... 0
 Number of clear days..... 13
 Number of fair days..... 13
 Number of cloudy days on which
 rain or snow fell..... 5
 Number of cloudy days on which no
 rain or snow fell..... 0
 Total Number of days on which
 rain or snow fell..... 15
 Date of Auroras..... 0
 Date of Solar Halos..... 0
 Date of Lunar Halos..... 0
 Date of Frost..... 0

NOTE.—The barometer is reduced to sea-level and freezing point, the elevation is 695 feet above mean sea-level. A dash in the rain column signifies the amount of precipitation is less than 0.01 inches.

WM. FINN, *Sergeant Signal Corps, U. S. A.*

METEOROLOGICAL REPORT.

Observations taken at Signal Office in Milwaukee, Wis., during the Month of August, 1879. Furnished for the use of the Commissioner of Health.

AUGUST.					Velocity of Wind.			State of		Rain.
Day and Date.	Barometer, Daily Mean.	Thermometer, Daily Mean.	Relative Humidity, Daily Mean.	Direction of Wind.	7 a. m.	2 p. m.	9 p. m.	Weather.	Inches.	
Friday..... 1	29.993	80.2	58.3	S W	10	20	12	Cloudy...	0.00	
Saturday..... 2	29.997	81.7	60.7	S W	12	18	3	Cloudy...	0.00	
Sunday..... 3	29.967	79.0	65.3	N E	9	9	4	L't Rain..	—	
Monday..... 4	29.850	73.5	79.7	W	3	12	11	Fair.....	0.06	
Tuesday..... 5	29.866	72.0	67.3	E	8	4	5	Cloudy....	0.00	
Wednesday... 6	29.816	70.5	80.0	S E	3	14	5	Cloudy....	0.00	
Thursday..... 7	29.870	68.7	59.3	N E	14	16	3	Clear.....	—	
Friday..... 8	30.072	63.2	58.3	E	10	6	6	Cloudy....	—	
Saturday..... 9	30.092	63.5	58.7	S E	4	15	6	Clear.....	0.00	
Sunday..... 10	29.930	71.2	55.0	W	12	20	19	Fair.....	—	
Monday..... 11	29.879	71.5	72.7	S E	2	17	16	Fair.....	0.22	
Tuesday..... 12	29.885	65.5	78.0	S W	11	22	48	Tr Hy Ra.	1.30	
Wednesday... 13	29.802	67.7	69.0	S W	8	19	9	Hazy.....	0.29	
Thursday..... 14	29.923	61.0	81.0	N	11	16	9	Cloudy....	0.00	
Friday..... 15	30.045	61.2	70.0	N E	15	16	15	Cloudy....	0.00	
Saturday..... 16	30.009	59.0	61.7	N	12	16	0	Clear.....	0.00	
Sunday..... 17	29.993	60.2	72.3	E	9	8	2	Clear.....	0.00	
Monday..... 18	30.012	63.5	73.0	S E	2	13	4	Clear.....	0.00	
Tuesday..... 19	29.962	67.0	72.3	S	4	19	6	L't Rain..	—	
Wednesday... 20	29.824	72.2	74.3	S	11	18	12	Fair.....	—	
Thursday..... 21	29.699	80.5	65.0	S W	16	24	19	Clear.....	0.00	
Friday..... 22	29.667	75.2	61.7	S W	25	14	7	Clear.....	0.00	
Saturday..... 23	29.794	65.7	80.3	N E	7	11	5	Clear.....	0.00	
Sunday..... 24	29.839	65.2	66.7	N E	10	18	16	Fair.....	0.00	
Monday..... 25	29.997	62.5	77.3	N E	6	10	4	Clear.....	0.00	
Tuesday..... 26	30.010	64.7	71.7	S	3	20	5	Fair.....	0.00	
Wednesday... 27	29.948	68.5	76.0	S	3	20	7	Clear.....	0.00	
Thursday..... 28	29.947	74.5	69.3	S	4	18	7	Clear.....	0.00	
Friday..... 29	30.026	78.5	58.3	S W	13	15	9	Clear.....	0.00	
Saturday..... 30	30.041	76.2	64.7	S W	8	14	7	Clear.....	0.00	
Sunday..... 31	29.912	76.0	62.7	S W	3	14	6	Clear.....	0.00	
Monthly Means..	29.919	69.4	68.4	-----	-----	-----	-----	-----	-----	

Highest Barometer.....	30.145— (9th)	direction.....	48 miles Northwest (12th)
Lowest ".....	29.591— (22d)	Number of foggy days.....	0
Monthly range of Barometer.....	0.554.	Number of clear days.....	0
Highest Temperature.....	91°—(2d)	Number of fair days.....	0
Lowest ".....	49°—(17th)	Number of cloudy days on which rain or snow fell.....	3
Monthly Range of Temperature.....	42°	Number of cloudy days on which no rain or snow fell.....	3
Greatest daily range of ".....	23°—(12th)	Total number of days on which rain or snow fell.....	9
Least daily range of ".....	6°—(14th)	Date of Auroras.....	0
Mean of Maximum ".....	76.7°	Date of Solar Halos.....	0
Mean of Minimum ".....	61.6°	Date of Lunar Halos.....	0
Mean daily range of ".....	15.1°	Date of Frost.....	0
Total amount of Precipitation—	1.87 inches.		
Prevailing wind—	S. W.		
Total movement of wind.....	8055 miles		
Maximum velocity of wind and			

NOTE.—The barometer is reduced to sea-level and freezing point, the elevation is 695 feet above mean sea-level. A dash in the rain column signifies the amount of precipitation is less than 0.01 inches.

JOHN DALY, *Pvt. Signal Corps, U. S. A.*

METEOROLOGICAL TABLE.

Observations taken at Signal Office in Milwaukee, Wis., during the Month of September, 1879. Furnished for the use of the Commissioner of Health.

SEPTEMBER.	Barometer, Daily Mean.	Thermometer, Daily Mean.	Relative Humidity, Daily Mean.	Direction of Wind.	Velocity of Wind.			State of Weather.	Rain. Inches.
					7 a. m.	a p. m.	9 p. m.		
Monday..... 1	29.875	67.7	83.3	NE	8	6	2	Lt. Rain.	0.02
Tuesday..... 2	29.821	65.0	92.3	N	7	12	17	Lt. Rain.	0.07
Wednesday.... 3	29.750	63.2	83.7	NW	20	14	5	Lt. Rain.	0.10
Thursday..... 4	29.976	60.2	84.7	W	13	14	6	Clear.....	0.00
Friday..... 5	29.980	60.2	65.3	S	5	10	10	Fair.....	0.05
Saturday..... 6	29.959	60.2	57.3	W	21	23	10	Clear.....	0.00
Sunday..... 7	29.955	54.7	80.7	NW	9	20	13	L't Rain..	0.25
Monday..... 8	30.197	52.2	69.3	NW	13	9	7	Fair.....	0.00
Tuesday..... 9	30.245	53.2	73.7	E	0	10	4	Clear.....	0.00
Wednesday.... 10	30.241	57.5	70.7	SE	5	17	15	Clear.....	0.00
Thursday..... 11	30.050	64.7	72.0	S	9	17	17	Cloudy....	0.10
Friday..... 12	29.878	61.7	62.7	W	21	22	9	L't Rain..	0.15
Saturday..... 13	29.983	54.0	72.3	N	5	15	10	Cloudy....	0.14
Sunday..... 14	30.092	53.0	80.0	E	11	7	8	Cloudy....	0.00
Monday..... 15	29.707	59.5	61.7	SW	16	20	11	Cloudy....	—
Tuesday..... 16	29.787	53.7	72.0	W	10	6	11	Cloudy....	0.15
Wednesday.... 17	29.974	57.5	51.3	NW	16	18	20	Fair.....	0.08
Thursday..... 18	30.175	51.5	68.0	NW	12	17	10	Clearing..	0.00
Friday..... 19	30.317	51.2	55.7	NW	5	12	8	Cloudy....	0.00
Saturday..... 20	30.331	52.0	59.7	SE	6	13	5	Clear.....	0.00
Sunday..... 21	30.180	55.2	70.7	SE	3	20	10	Cloudy....	—
Monday..... 22	29.998	61.0	76.3	SW	7	10	11	Cloudy....	0.04
Tuesday..... 23	30.098	53.2	74.7	NW	4	12	12	Cloudy....	—
Wednesday.... 24	30.336	45.0	62.0	N	8	8	4	Clear.....	0.00
Thursday..... 25	30.225	51.5	60.0	SW	10	11	9	Clear.....	0.00
Friday..... 26	30.014	56.2	66.7	SE	5	27	14	Cloudy....	—
Saturday..... 27	29.821	64.2	84.0	S	25	14	10	Tr Storm	0.84
Sunday..... 28	29.785	73.2	78.7	S	10	21	23	Cloudy....	—
Monday..... 29	29.932	79.5	83.3	SW	16	16	14	Cloudy....	0.02
Tuesday..... 30	30.036	74.0	68.9	SW	14	16	5	Fair.....	—
Monthly Means..	30.027	58.6	71.4	—	—	—	—	—	—
Highest Barometer.....	30.394	(20th)		direction.....	34 miles S. W,	(29th)			
Lowest Barometer.....	29.686	(3d)		Number of foggy days.....		0			
Monthly range of Barometer..	0.708			Number of clear days.....		5			
Highest Temperature.....	81°	(30th)		Number of fair days.....		17			
Lowest Temperature.....	35°	(24th)		Number of cloudy days on which rain or snow fell.....		8			
Monthly range of Temp'ture.	46°			Number of cloudy days on which no rain or snow fell.....		0			
Greatest daily range of "	25.0°	(25th)		Total number of days on which rain or snow fell.....		19			
Least daily range of "	6°	(2d)		Date of Auroras.....		0			
Mean of Maximum "	65.8°			Date of Solar Halos.....		0			
Mean of Minimum "	50.7°			Date of Lunar Halos.....		0			
Mean daily range of "	15.1°			Date of Frost.....		(25th)			
Total amount of Precipitation.	2.00	inches.							
Prevailing wind.....	N. W.								
Total movement of wind.....	8401	miles.							
Maximum velocity of wind and									

NOTE—The barometer is reduced to sea-level and freezing point, the elevation is 695 feet above mean sea-level. A dash in the rain column signifies the amount of precipitation is less than 0.01 inches.

WM. FINN, *Sergeant Signal Corps, U. S. A.*

METEOROLOGICAL REPORT.

Observations taken at Signal Office in Milwaukee, Wis., during the Month of October, 1879, Furnished for the use of the Commissioner of Health.

OCTOBER. Day and Date.	Barometer, Daily Mean.	Thermometer Daily Mean.	Relative Humidity, Daily Mean.	Direction of Wind.	Velocity of Wind.			State of Weather.	Rain, Inches.
					7 a. m.	2 p. m.	9 p. m.		
Wednesday... 1	30.030	67.5	74.3	S E	6	10	9	Fair.....	0.00
Thursday.... 2	29.985	67.5	86.0	S E	13	12	13	Lt. Rain..	0.51
Friday..... 3	30.155	61.7	51.0	W	13	9	5	Smoky....	0.00
Saturday.... 4	29.971	61.7	75.0	S	5	13	7	Fair.....	0.00
Sunday..... 5	29.920	71.2	73.0	S	5	14	5	Clear.....	0.00
Monday..... 6	29.979	66.7	79.0	S	4	14	10	Fair.....	0.00
Tuesday.... 7	29.979	66.5	79.0	S	1	4	6	Cloudy....	0.05
Wednesday.. 8	29.940	64.5	92.3	E	3	2	2	Foggy.....	0.35
Thursday... 9	29.923	65.0	85.7	S E	6	14	10	Fair.....	0.00
Friday..... 10	30.049	67.7	72.0	N E	3	4	8	Fair.....	0.00
Saturday... 11	30.075	60.5	88.0	Calm.	14	6	0	Cloudy....	0.00
Sunday..... 12	30.162	58.5	89.7	N	5	20	20	Foggy.....	0.00
Monday..... 13	30.136	61.5	92.0	E	4	6	4	Foggy.....	0.00
Tuesday.... 14	30.096	65.2	87.3	Calm.	0	13	8	Clear.....	0.02
Wednesday.. 15	30.031	66.5	85.7	S E	5	12	8	Clear.....	0.00
Thursday... 16	29.863	64.5	89.0	S E	4	9	11	Lt. Rain..	0.00
Friday..... 17	29.692	58.2	72.7	SW	16	27	24	Cloudy....	1.05
Saturday... 18	29.170	49.7	65.7	NW	16	16	14	Cloudy....	0.00
Sunday..... 19	30.364	46.7	72.3	E	10	5	4	Clear.....	0.00
Monday..... 20	30.127	49.2	72.3	S E	8	15	6	Clear.....	0.00
Tuesday.... 21	29.947	51.7	70.3	SW	6	10	7	Clear.....	0.00
Wednesday.. 22	29.921	51.2	66.0	W	8	26	25	Cloudy....	0.00
Thursday... 23	30.402	39.5	53.3	NW	15	18	7	Cloudy....	0.00
Friday..... 24	30.545	40.2	55.3	W	2	12	7	Clear.....	0.00
Saturday... 25	30.501	44.0	50.0	S	7	14	15	Clear.....	0.00
Sunday..... 26	30.250	48.7	52.5	S	8	23	3	Clear.....	0.00
Monday..... 27	29.776	50.7	56.7	SW	16	22	26	Clear.....	0.00
Tuesday.... 28	29.720	47.5	65.3	W	23	17	11	Cloudy....	0.03
Wednesday.. 29	29.695	46.2	48.7	W	19	34	22	Fair.....	0.00
Thursday... 30	30.194	34.0	58.3	NW	17	23	7	Fair.....	0.00
Friday..... 31	30.404	28.2	66.7	W	12	17	13	Fair.....	0.00
Monthly Means..	30.065	55.6	71.8	-----	-----	-----	-----	-----	-----

Highest Barometer.....30.609 (25th).
 Lowest Barometer.....29.517 (29th).
 Monthly range of Barometer. 1.092.
 Highest Temperature..... 81° (5th).
 Lowest Temperature..... 25° (31st).
 Monthly range of Temperature. 56°.
 Greatest daily range of " 24° (22d).
 Least daily range of " 5° (11&15).
 Mean of Maximum " 62.3°.
 Mean of Minimum " 49.6°.
 Mean daily range of " 12.7°.
 Total amount of Precipitation. 2.01 inches.
 Prevailing wind.....Southwest.
 Total movement of wind.....7839 miles.
 Maximum velocity of wind and

direction.....40 miles W., N. W., 30th.
 Number of foggy days..... 2
 Number of clear days..... 9
 Number of fair days..... 12
 Number of cloudy days on which rain or snow fell..... 6
 Number of cloudy days on which no rain or snow fell..... 4
 Total number of days on which rain or snow fell..... 11
 Date of Auroras..... 0
 Date of Solar Halos..... 0
 Date of Lunar Halos..... 0
 Date of Frost.....19th, 20th, 23d and 24th.

NOTE.—The barometer is reduced to sea-level and freezing point, the elevation is 695 feet above mean sea-level. A dash in the rain column signifies the amount of precipitation is less than 0.01 inches.

WM. FINN, *Sergeant Signal Corps, U. S. A.*

METEOROLOGICAL REPORT.

Observations taken at Signal Office in Milwaukee, Wis., during the Month of November, 1879. Furnished for the use of the Commissioner of Health.

NOVEMBER. Day and Date.	Barometer, Daily Mean.	Thermometer, Daily Mean.	Relative Humidity, Daily Mean.	Direction of Wind.	Velocity of Wind.			State of Weather.	Rain. Inches.
					7 a. m.	3 p. m.	9 p. m.		
Saturday..... 1	30.371	27.2	63.3	W	7	9	7	Clear.....	—
Sunday..... 2	30.126	25.2	83.7	NW	6	28	21	Lt. Snow.	0.06
Monday..... 3	30.393	19.7	65.7	NW	12	15	4	Clear.....	0.01
Tuesday..... 4	30.330	25.7	75.0	SW	5	4	6	Fair.....	0.00
Wednesday..... 5	30.044	37.2	65.3	W	13	7	4	Cloudy.....	—
Thursday..... 6	29.942	46.7	67.3	S	5	17	12	Clear.....	0.00
Friday..... 7	29.801	53.5	85.0	SW	22	18	7	Cloudy.....	0.00
Saturday..... 8	29.584	59.2	80.0	S	18	12	34	Cloudy.....	0.01
Sunday..... 9	30.046	43.2	65.0	W	12	17	8	Clear.....	—
Monday..... 10	30.196	44.0	80.0	E	2	6	9	L't Rain.	0.25
Tuesday..... 11	29.759	50.7	85.3	SW	5	23	11	Cloudy.....	0.78
Wednesday..... 12	29.715	49.0	86.0	W	16	23	4	Fair.....	0.85
Thursday..... 13	29.777	49.5	90.7	NE	4	6	10	Foggy.....	0.00
Friday..... 14	29.530	48.2	78.3	W	3	13	8	Foggy.....	0.00
Saturday..... 15	29.624	45.5	66.7	SW	8	24	20	Clear.....	0.00
Sunday..... 16	30.173	39.5	60.3	W	12	12	1	Cloudy.....	0.00
Monday..... 17	30.338	34.0	72.7	NE	12	20	15	Cloudy.....	0.00
Tuesday..... 18	30.302	35.0	64.3	NW	9	11	9	Cloudy.....	—
Wednesday..... 19	29.939	29.7	62.0	NW	19	20	27	Cloudy.....	—
Thursday..... 20	30.398	15.5	65.0	NW	26	20	9	Clear.....	0.00
Friday..... 21	30.211	21.7	68.0	SW	8	8	8	Cloudy.....	0.00
Saturday..... 22	29.639	34.5	70.7	SW	18	16	9	Cloudy.....	—
Sunday..... 23	30.226	24.7	74.7	NW	16	20	4	Clear.....	0.00
Monday..... 24	29.877	36.0	62.0	S	14	20	14	Fair.....	0.00
Tuesday..... 25	30.211	31.7	72.0	SW	12	12	5	Clear.....	0.00
Wednesday..... 26	30.045	38.0	87.0	S	5	26	7	L't Rain..	0.31
Thursday..... 27	29.734	46.0	90.3	W	15	19	9	Lt. Rain..	0.51
Friday..... 28	29.809	30.0	81.7	NW	25	26	17	Sleet.....	0.87
Saturday..... 29	30.427	21.2	81.3	NW	14	12	2	Clear.....	0.00
Sunday..... 30	30.181	30.5	84.7	S	13	18	19	Cloudy.....	—
Monthly Means..	30.025	36.8	74.5	-----	-----	-----	-----	-----	-----

Highest Barometer.....30.522—(29th)
 Lowest ".....29.414—(8th)
 Monthly range of Barometer...1.088
 Highest Temperature.....67°—(11th)
 Lowest Temperature.....9°—(4th)
 Monthly range of Temperature..58°—
 Greatest daily range of " 23.0°—(4&11)
 Least daily range of " 6.0°—(2&17)
 Mean of Maximum " 43.5°
 Mean of Minimum " 29.6°
 Mean daily range of " 13.9°
 Total amount of Precipitation—3.65 inches.
 Prevailing wind—W.
 Total movement of wind.....—9158 miles.
 Maximum velocity of wind and direc-

tion.....38 miles N. W. (19th)
 Number of foggy days..... 2
 Number of clear days..... 5
 Number of fair days..... 9
 Number of cloudy days on which
 rain or snow fell..... 13
 Number of cloudy days on which no
 rain or snow fell..... 3
 Total Number of days on which
 rain or snow fell..... 16
 Date of Auroras..... 0
 Date of Solar Halos..... 0
 Date of Lunar Halos..... 21st and 25th
 Date of Frost..... 16th and 25th

NOTE—The barometer is reduced to sea-level and freezing point, the elevation is 695 feet above mean sea-level. A dash in the rain column signifies the amount of precipitation is less than 0.01 inches.

WM. FINN, *Sergant Signal Corps, U. S. A.*

METEOROLOGICAL TABLE.

Observations taken at Signal Office in Milwaukee, Wis., during the Month of December, 1879. Furnished for the use of the Commissioner of Health.

DECEMBER.	Barometer, Daily Mean.	Thermometer, Daily Mean.	Relative Humidity, Daily Mean.	Direction of Wind.	Velocity of Wind.			State	Rain Inches.
					7 a. m.	2 p. m.	9 p. m.	of Weather.	
Day and Date.									
Monday..... 1	29.990	38.2	75.7	S W	9	8	2	Fair.....	0.00
Tuesday..... 2	29.898	35.7	87.3	N	8	11	16	Lt. Rain..	—
Wednesday... 3	30.076	30.7	85.7	N W	16	10	6	Cloudy...	—
Thursday..... 4	30.173	38.5	78.0	S E	3	20	20	Cloudy...	0.00
Friday..... 5	29.570	47.0	84.3	S E	21	18	24	Cloudy...	0.04
Saturday..... 6	29.527	37.2	81.3	W	20	24	17	Cloudy...	0.03
Sunday..... 7	29.942	26.7	80.7	W	22	15	9	Cloudy...	0.00
Monday..... 8	30.253	30.5	82.0	N E	11	11	14	Cloudy...	—
Tuesday..... 9	29.716	43.7	91.3	S E	35	13	18	Lt. Rain..	0.59
Wednesday... 10	29.700	26.2	72.7	W	22	34	38	Lt. Snow..	0.20
Thursday..... 11	30.205	11.5	74.3	N W	18	18	12	Clear.....	—
Friday..... 12	30.392	14.0	69.7	S W	8	14	6	Clear.....	0.00
Saturday..... 13	30.340	24.7	86.0	S	7	18	9	Clear.....	0.00
Sunday..... 14	29.939	31.5	79.0	S W	8	4	3	Cloudy...	0.00
Monday..... 15	29.989	12.7	76.0	S W	19	19	4	Clear.....	—
Tuesday..... 16	29.962	16.0	85.7	N W	6	8	15	L't Snow..	0.49
Wednesday... 17	30.440	-1.2	74.7	W	13	20	13	Clear.....	0.00
Thursday..... 18	30.397	2.7	72.7	N W	6	7	10	L't Snow..	0.02
Friday..... 19	30.169	19.5	84.7	W	5	4	14	L't Snow..	0.03
Saturday..... 20	30.352	11.5	80.3	N	13	18	16	Cloudy...	0.06
Sunday..... 21	29.883	27.0	87.3	S E	26	39	28	L't Rain..	0.10
Monday..... 22	30.114	14.2	77.0	W	22	24	8	Clear.....	0.02
Tuesday..... 23	30.019	25.0	85.0	S E	10	22	9	Cloudy...	0.09
Wednesday... 24	30.236	14.0	82.3	W	13	14	15	L't Snow..	0.01
Thursday..... 25	30.305	-5.2	68.0	W	20	23	21	Clear.....	0.02
Friday..... 26	30.218	0.7	65.7	W	15	8	11	Cloudy...	0.00
Saturday..... 27	29.871	30.7	78.7	S W	13	14	4	Fair.....	0.00
Sunday..... 28	29.685	32.0	81.7	Calm.	0	12	11	Cloudy...	—
Monday..... 29	30.009	25.2	87.7	N W	13	10	15	Cloudy...	—
Tuesday..... 30	30.384	23.0	85.0	N	14	11	20	Cloudy...	0.01
Wednesday... 31	30.240	25.7	83.3	S W	5	16	20	Clear.....	0.05
Monthly Means..	30.064	23.5	80.1	.....	.....	.....	.....	.....	.....

Highest Barometer.....	30.510	(18th)	direction.....	43 miles S. E., (21st)
Lowest Barometer.....	29.383	(6th).	Number of foggy days.....	0
Monthly range of Barometer..	1.127.		Number of clear days.....	4
Highest Temperature.....	57°	(10th).	Number of fair days.....	9
Lowest Temperature.....	12°	(26th).	Number of cloudy days on which rain or snow fell.....	15
Monthly range of Temp'ture.	69°		Number of cloudy days on which no rain or snow fell.....	3
Greatest daily range of "	38.0°	(10th).	Total number of days on which rain or snow fell.....	22
Least daily range of "	5°	(3d).	Date of Auroras.....	0
Mean of Maximum	37.8°		Date of Solar Halos.....	0
Mean of Minimum	14.9°		Date of Lunar Halos.....	0
Mean daily range of "	16.9°		Date of Frost.....	0
Total amount of Precipitation.	1.76 inches.			
Prevailing wind.....	W.			
Total movement of wind.....	10700 miles.			
Maximum velocity of wind and				

NOTE—The barometer is reduced to sea-level and freezing point, the elevation is 695 feet above mean sea-level. A dash in the rain column signifies the amount of precipitation is less than 0.01 inches.

WM. FINN, *Sergeant Signal Corps, U. S. A.*

ANNUAL METEOROLOGICAL SUMMARY.

1879.	BAROMETER.			THERMOMETER.			PRECIPITATION.		WIND.		
	Highest.	Lowest.	Mean.	Highest.	Lowest.	Mean.	Total amount of rainfall or melted snow, inches.	No. of days on which rain or snow fell.	Prevailing Direc- tion.	Highest Velocity.	Total Movement for the Month.
January.....	30.488	29.483	30.092	46	-20	31.6	0.51	11	W	41	9826
February.....	30.581	29.544	30.083	48	-12	33.7	1.62	16	NW	36	8723
March.....	30.622	29.559	30.044	68	18	35.8	0.92	15	W	44	9960
April.....	30.359	29.053	29.990	73	13	43.9	2.04	7	N	40	8548
May.....	30.442	29.451	29.997	85	32	53.8	2.29	13	SW	40	8832
June.....	30.369	29.297	29.946	85	40	62.0	2.66	14	SS	56	6753
July.....	30.177	29.523	29.899	91	53	71.8	3.59	15	SS	38	7351
August.....	30.145	29.591	29.919	91	49	69.4	1.87	9	SS	48	8055
September.....	30.394	29.686	30.027	81	35	56.4	2.00	19	SS	34	8401
October.....	30.669	29.517	30.065	81	25	55.8	2.01	11	SW	40	7839
November.....	30.522	29.434	30.025	67	9	36.5	3.66	16	W	38	9158
December.....	30.510	29.383	30.064	57	-12	23.4	1.76	22	W	43	10700
Annual Means.....	30.435	29.460	30.013	72.7	18.3	46.4	2.08	14	41.5	8679.3

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